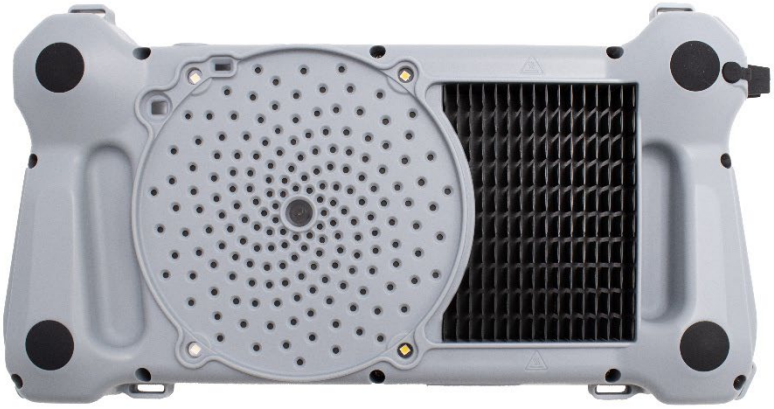
SONOTEC



# Operating Manual

## SONASCREEN 2

Acoustic camera for preventive maintenance

Translation of the German Original

Revision: 1.0 | 2024-07-19

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# 1. Introduction

This section is intended to explain function, structure and representations of this documentation to simplify handling of this documentation.

## 1.1 Notes on this documentation

**Purpose**
This documentation constitutes an integral part of the product and contains important advice on safe operation as well as all information on intended and efficient use. Thus, any person using the product must have read and understood this documentation.

**Accessibility**
The staff working with this product must have constant access to this documentation to prevent handling errors and guarantee trouble-free operation.

**Up-to-datedness**
Every effort has been made to ensure that the information contained in this documentation is complete and correct at the time of release. This documentation describes all units and functions known at the current point of time.

## 1.2 Representations in this documentation

**Illustrations**
Illustrations used in this documentation do not always contain all details or special cases. They only represent the relevant information.

**Tips**
Tips are marked as follows:

> Tips describe specific information or particular features that might not be evident, even for experienced users. The neglect of a tip poses no direct safety risk. However, it can lead to workflow disruptions.

**General icons**

The following general icons are used for visual emphasis:

| Icon | Function |
|---|---|
| | Indicates a link to external content. |

## 1.3 Identification of warning instructions

**Classes of danger, signal words and colors**

This documentation contains warnings regarding hazards of different classifications. These classes are characterized by signal words and colors. They include the following:

**⚠ DANGER**

Warns of immediate danger, which, if ignored, may lead to death or serious injury.

**⚠ WARNING**

Warns of possible immediate danger, which, if ignored, may lead to lasting damage to health and/or property – including financial losses due to operational impairment.

**⚠ CAUTION**

Warns of dangers, which, if ignored, may lead to injury or damage to property – including damage to property due to operational interruptions.

**ATTENTION**

Warns of dangers, which, if ignored, may lead to damage to property – including damage to property due to operational interruptions.

# 2. Safety instructions

This section contains safety information relating to the protection of persons as well as safe and fault-free operation. All user groups of the product must be aware of and follow these safety provisions.

## 2.1 Introduction

Reliable and safe operation of the product depends on the careful handling and execution of operational and setting tasks.
Ignoring these safety instructions and warning information may lead to serious injury with lasting health consequences for personnel as well as damage or destruction of product components.
During handling of the product, please observe all safety instructions and warning information in all parts of this user documentation as well as the related codes of practice. Ensure that all those working with the product are also aware of these instructions.
Generally applicable safety regulations (such as accident prevention and environmental protection regulations, etc.) must also be observed.

## 2.2 Basic hazards

**Definition**
Basic hazards are residual risks that remain even with safety-conscious intended use.

**State of the art**
The product meets the current state of the art and applicable safety rules. All components of the product are tested thoroughly before they leave the factory and are delivered in a condition for safe operation.

**⚠ WARNING**

**Danger of injury!**
Improper use of the product may lead to injuries.

- Do not open the product.
- Protect the product against extreme heat (excessive sunlight, immediate vicinity of open fire or heating devices) during operation and storage.
- Avoid strong impacts that could damage the device and/or its components.

**ATTENTION**

**Possible damage of the device display!**
Improper use may damage the device display.

- Do not use scratching or sharp objects to operate the device by touch screen. Commercially available pens for touch screens are suitable.

## 2.3 Personnel and qualifications

**Basic requirements**
The product must only be used by operators that have completely read and understood the safety instructions and all documents of the user documentation.
Personnel undergoing training or instructions or persons taking part in general vocational training programs may only operate the device under the continuous supervision of operating or technical personnel.

**Responsibility of the operating company**
Regarding the personnel authorized and/or trained by the operating company, the operating company carries the following responsibilities:

- The necessary training and instruction of personnel must be guaranteed.
- All personnel's competences and responsibilities must be clearly stated and documented.
- All user information on the product (operating manual, user documentation etc.) must be kept in the immediate vicinity of the product and must be accessible at all times.

## 2.4 Safety-conscious working practices

**Accident prevention and environmental protection**
In addition to the instructions in this operating manual, please mind the generally applicable legal and other regulations on accident prevention and environmental protection.
This may include, for example:

- Handling of hazardous materials
- Wearing the required and mandatory personal protective clothing and safety equipment
- Observing of and complying with all national and regional industrial safety regulations
- Observing of and complying with all internal working, operating and safety regulations

## 2.5 Use of the product

**Measures for personal safety**
Improper use of the product may lead to injuries of operating personnel.

- During detection of ultrasonic signals on electrical equipment, make sure to keep the mandatory safety distance from detected electrical defects.
- Always make sure that both hands are free for self-protection, if necessary.
- Always make sure to keep your hands, the product and/or connected equipment within your field of vision.
- Carry the device by the carrying strap when climbing up and down ladders and stairs. Always carry the device by the carrying strap in such a way that the carrying strap does not get caught or entangled in moving parts.
- Use the torchlight functionality (LED light) of the product and/or additional lighting to illuminate test sites with poor visibility.
- Always use the product without distraction. Do not read messages on the display and/or operate the product while walking.

**Measures for protection of the product and/or equipment**
Improper use of the product may lead to product damage. Damaged components may affect or distort the measurement result quality.

- During use, charging and storage, protect the device against extreme, unusual heat (excessive sunlight, storage in heated cars or immediate vicinity of open fire or heating devices). It is critical to stay within the temperature ranges given in the technical specification.
- Do not use the product and its accessories if they display functional errors and/or visible damage.
- Only connect the product to approved equipment received from SONOTEC GmbH or its sales partners.
- The product adheres to the protection class given in the technical specification and is protected against splash water. Do not submerge the product in liquids.

- Handle the product with care and protect it against major shocks. Use the carrying case to transport and store the product.
- When using the product, always make sure that cables cannot get stuck and/or caught in moving parts.
- If you use the product on a tripod, make sure to place the tripod on a solid no-slip surface. The tripod must always stand safely and stable.
- Do not use the product within strong electromagnetic fields.
- Do not use scratching or sharp objects to operate the touchscreen. Apart from operation by finger touch, commercially available touchscreen pens or touchscreen gloves are suitable.

## 2.6 Modifications and alterations

**No modifications on the product and/or accessories**

The product and/or its accessories must not be opened or disassembled. The product does not contain any components to be cleaned, maintained or repaired by operators.
Unauthorized modifications of the product and/or its accessories are prohibited and lead to exclusion of liability by the manufacturer for resulting damage and consequences.

**Spare parts and accessories**

Spare parts and accessories must comply with the technical requirements specified by SONOTEC GmbH and its suppliers. Whenever original parts are used, compliance is given.

**No alterations to the software**

Do not alter the supplied software or commission software alterations to third parties. The software may not be disassembled, decrypted or decompiled in full or in part.

## 2.7 Data security

**Data loss**

The loss of measurement data may lead to incomplete measuring chains or misinterpretations.

- Always make sure to backup measurement data regularly on external data media.
- Back up your measurement data before updating the software or resetting the device to factory settings.

**Cyber security measures**

Based on analysis of vulnerabilities according to IEC 62443-4-1 and IEC 62443-4-2, no cyber security measures are necessary for the product.
However, a cyber attack on the product and its environment can never be completely ruled out. Thus, we strongly recommend to implement safety measures (e.g. anti-virus programs, firewalls, access restrictions) against potential cyber attacks within the product environment.

# 3. Description of the device

This section describes the components, the operating elements and the software of the SONASCREEN acoustic camera.

## 3.1 Intended use

SONASCREEN is an acoustic camera with touch screen for indoor and outdoor detection, visualization and recording of sound signals up to 100 kHz. It must only be used in industrial environments.
The measurement data captured by SONASCREEN can be analyzed and evaluated either directly on the device or on a personal computer.

## 3.2 Prohibited use

Any use not approved by SONOTEC GmbH is prohibited and may lead to injury or damage to property.
SONOTEC GmbH accepts no liability for damage caused by prohibited use of the product.
Prohibited are in particular:

- Use of equipment and/or accessories with visible damage
- Use in wet rooms
- Use in potentially explosive environments
- Use in environmental conditions that do not adhere to the stipulated requirements
- Unauthorized modifications of the equipment, the software and/or accessories
- Use of unauthorized spare parts and/or unauthorized accessories
- Performing measurements while the device's power supply unit is connected to the power network (e.g. during charging).
- Opening the device for any other purpose than disposal.

Operating or using the product incorrectly and/or not in the sense of its intended use may lead to risk of death and personal injury.

## 3.3 Set

The device is delivered in a set as follows:

| Designation | Article number |
|---|---|
| SONASCREEN 2 Acoustic Camera - Set | 700 01 0432 |

### Components

The delivered set contains the following components:

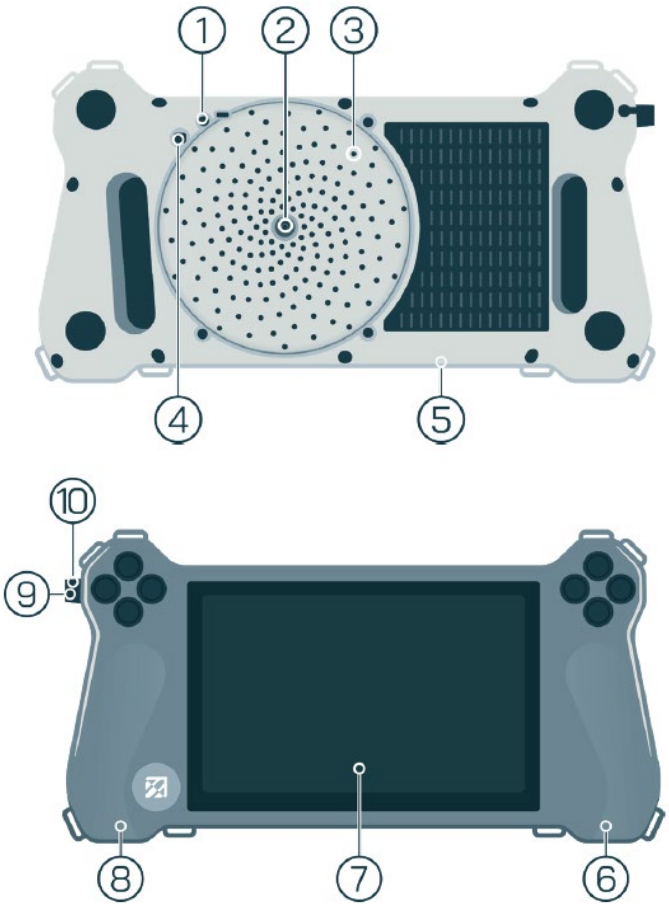
| Designation | Article number |
|---|---|
| SONASCREEN 2 acoustic camera (included in set 700 01 0432) | 400 01 0273 |
| Charger/power supply for SONASCREEN 2 acoustic camera | 400 01 0274 |
| USB-C cable | 400 01 0275 |
| Peltor earmuffs, noise protection headphones | 400 01 0138 |
| Audio cable for Peltor earmuffs, noise protection headphones | 400 01 0139 |
| Pelican hard shell case for SONASCREEN 2 | 400 01 0276 |
| USB flash drive for SONASCREEN | 026 00 0100 |
| Short operating instructions "Quick start" | 500 01 0260 |
| Carrying strap SONASCREEN | 400 01 0246 |
| Calibration certificate | |

### Optionals

The following optional items can be purchased together with the camera or separately

| Description | Article number |
|---|---|
| Powerbank für SONASCREEN 2 | 400 01 0267 |

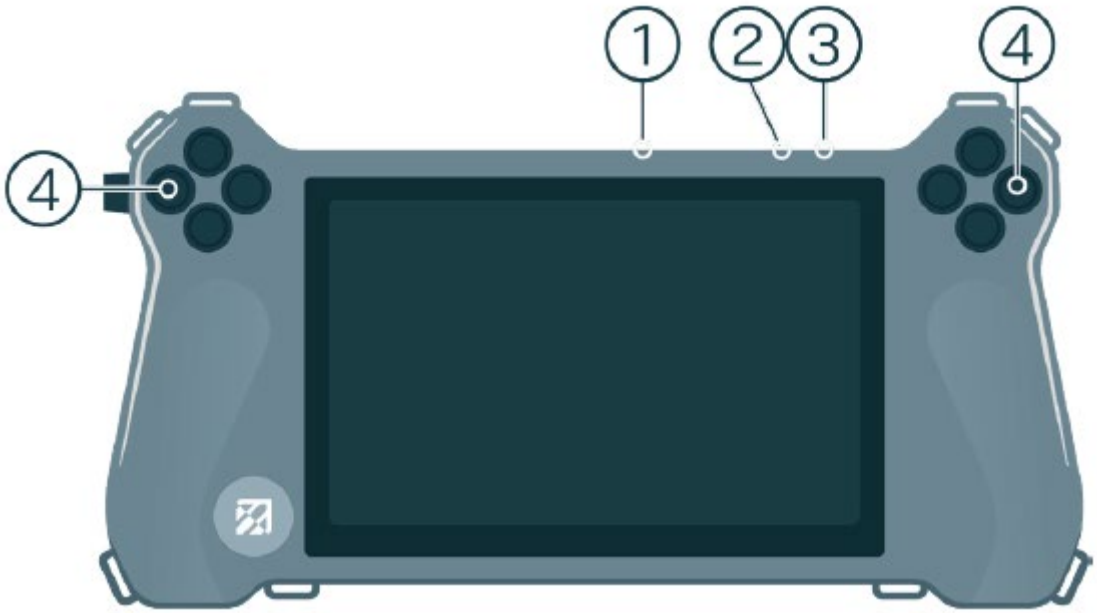
## 3.4 Connections, interfaces, device elements




| No. | Connection/interface/device element |
|---|---|
| 1 | LEDs (torchlight functionality) |
| 2 | Camera for detection of optical signals |
| 3 | Infrared sensor |
| 4 | Microphones for detection of acoustic signals |
| 5 | Connection for tripod adapter plate |
| 6 | Connection for charger/power supply |
| 7 | Touch screen |
| 8 | Earphone connection (jack socket 3.5 mm) |
| 9 | Ethernet interface (RJ45 socket) |
| 10 | USB interface (USB type A) |

## 3.5 Status display and device buttons

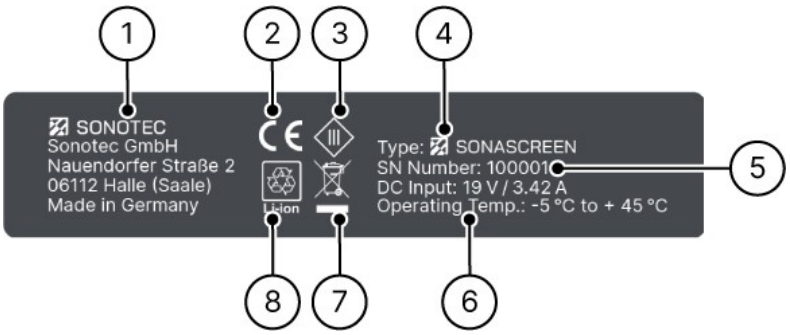
**Structure**




| No | Component | Description / Function |
|---|---|---|
| 1 | Status-LEDs Charge Level | Show the current charging status of the device. |
| 2 | Status-LED | Shows the actual device status:<br>• **Flashing:** Device is starting<br>• **Green:** device is switched on |
| 3 | On/Off-Button | • **Press briefly:** Display the charge status with the status LEDs<br>• **Press and hold (3 s):** Switch device on or off |
| 4 | Function keys | Can be assigned predefined functions in the software settings. |

## 3.6 Device labeling

### Identification plate

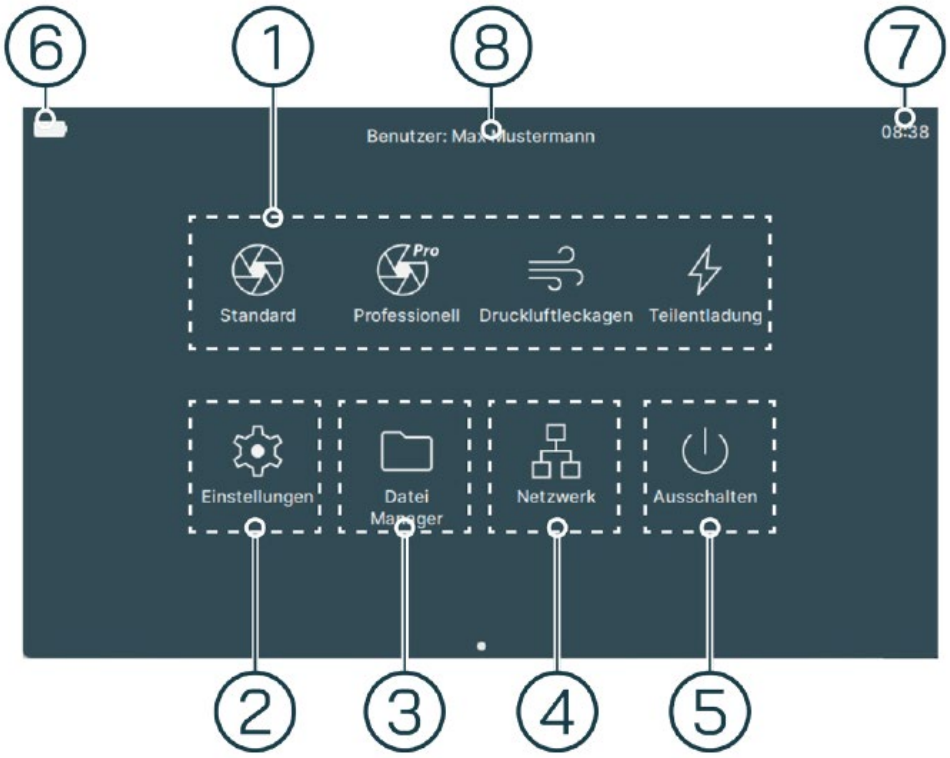



| No. | Identification |
|---|---|
| 1 | Manufacturer’s address |
| 2 | CE marking |
| 3 | Symbol protection class |
| 4 | Device designation |
| 5 | Serial number |
| 6 | Power rating |
| 7 | Disposal symbol |
| 8 | Symbol Lithium-Ion battery |

# 4. User interface

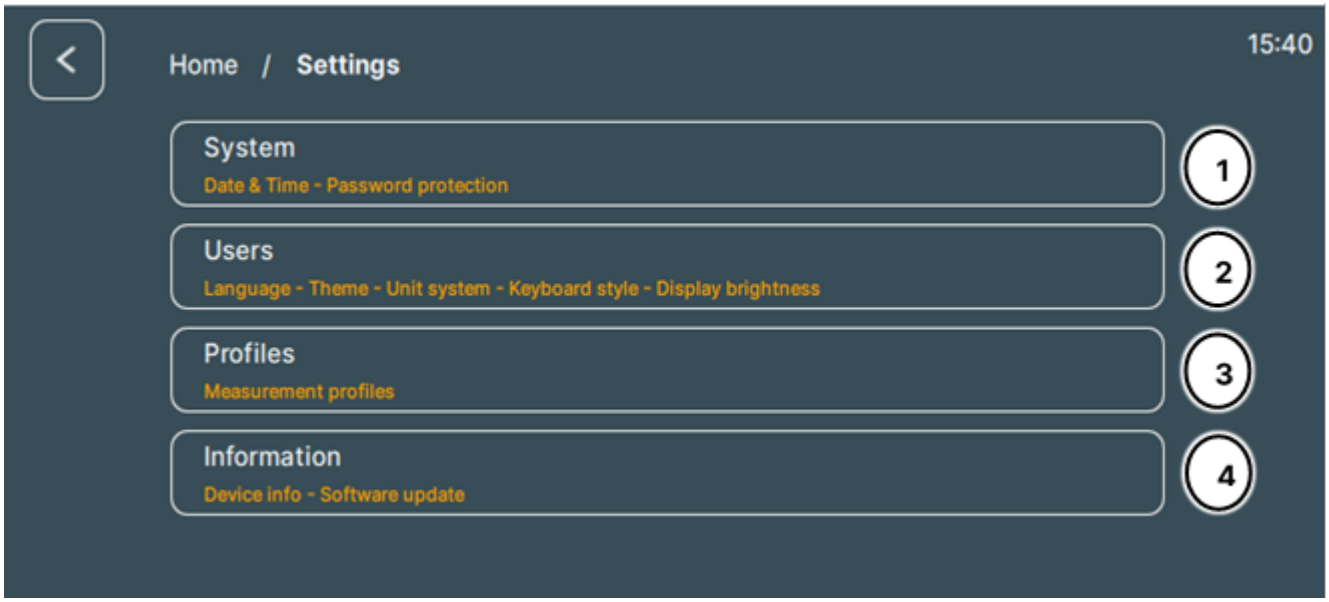
This section describes the software's screens. Depending on the use of the software (directly on the device or on a personal computer), individual functions may be activated or deactivated.

## 4.1 Start




| No | Type | Description/function |
|---|---|---|
| 1 | Measurement Modes | Opens the specific measurement mode. |
| 2 | Settings | Opens the “Settings” screen. |
| 3 | File Gallery | Opens a screen for data management. |
| 4 | Network Mode | Control the device via the LAN interface using a PC. |
| 5 | Shut down | Shuts down the device. |
| 6 | Battery Level | Display the current battery level. |
| 7 | Time | Displays the current time. |
| 8 | User Profile | Displays the selected user profile (can be created in the settings). |

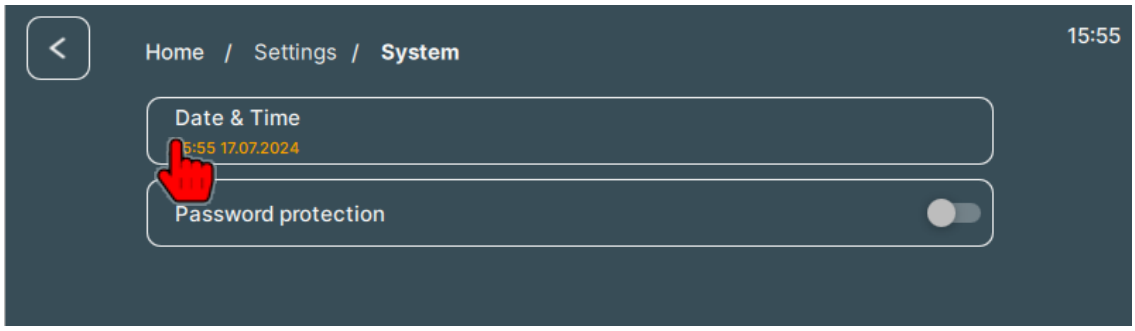
## 4.2 Settings



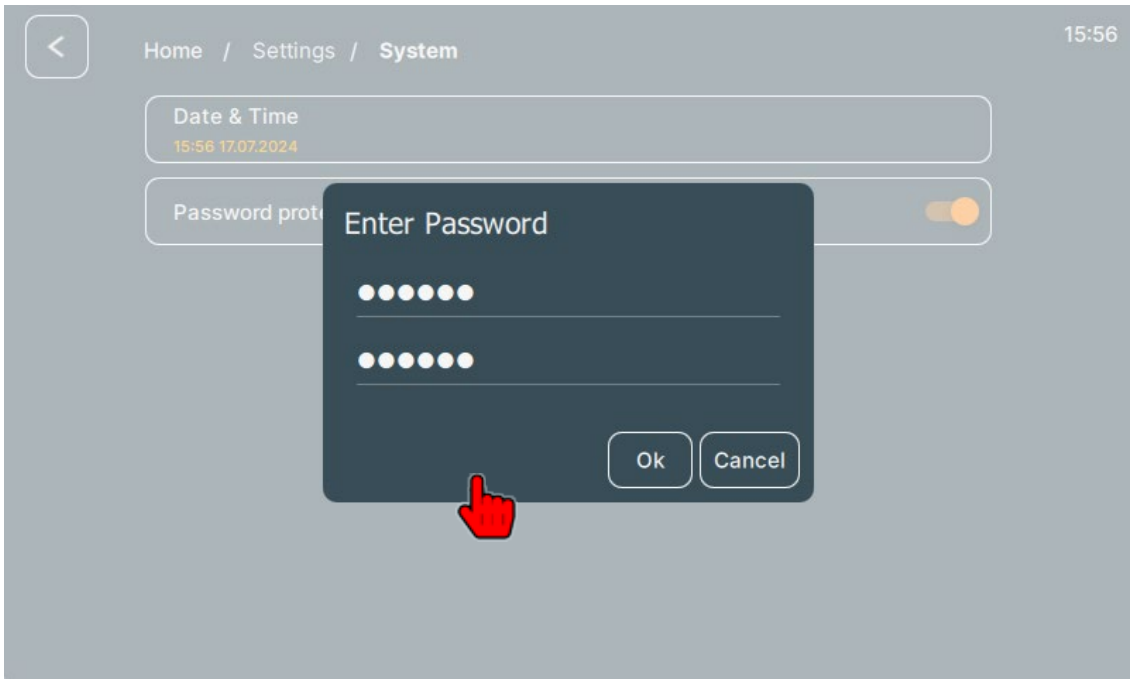

| No | Type | Description / Function |
|---|---|---|
| 1 | System | Opens a menu for setting:<br>Date & Time<br>Password protection |
| 2 | Users | Opens a menu for creating or selecting user profiles that have already been created. The following parameters can be adjusted there:<br>• Language<br>• Color scheme user interface<br>• System of unit<br>• Virtual keyboard<br>• Display brightness<br>• Home screen grid |
| 3 | Profiles | Opens a menu where the predefined measurement profiles can be adjusted or new profiles can be created. This includes setting options for the following parameters, among others:<br>• User interface<br>• Frequencies<br>• Distance<br>• Acoustics<br>• Recording time and some other setting options |
| 4 | Information | Opens a screen with the following information:<br>Device information<br>Software updates |

### 4.2.1 System

Enter the desired values in the Date & Time menu.




A password can be created in the Password Protection menu, which must be entered when starting the device.




Resetting the password

If no password is available anymore, the device may either be:

- reset (see "Resetting the device") or
- unlocked by a master password.

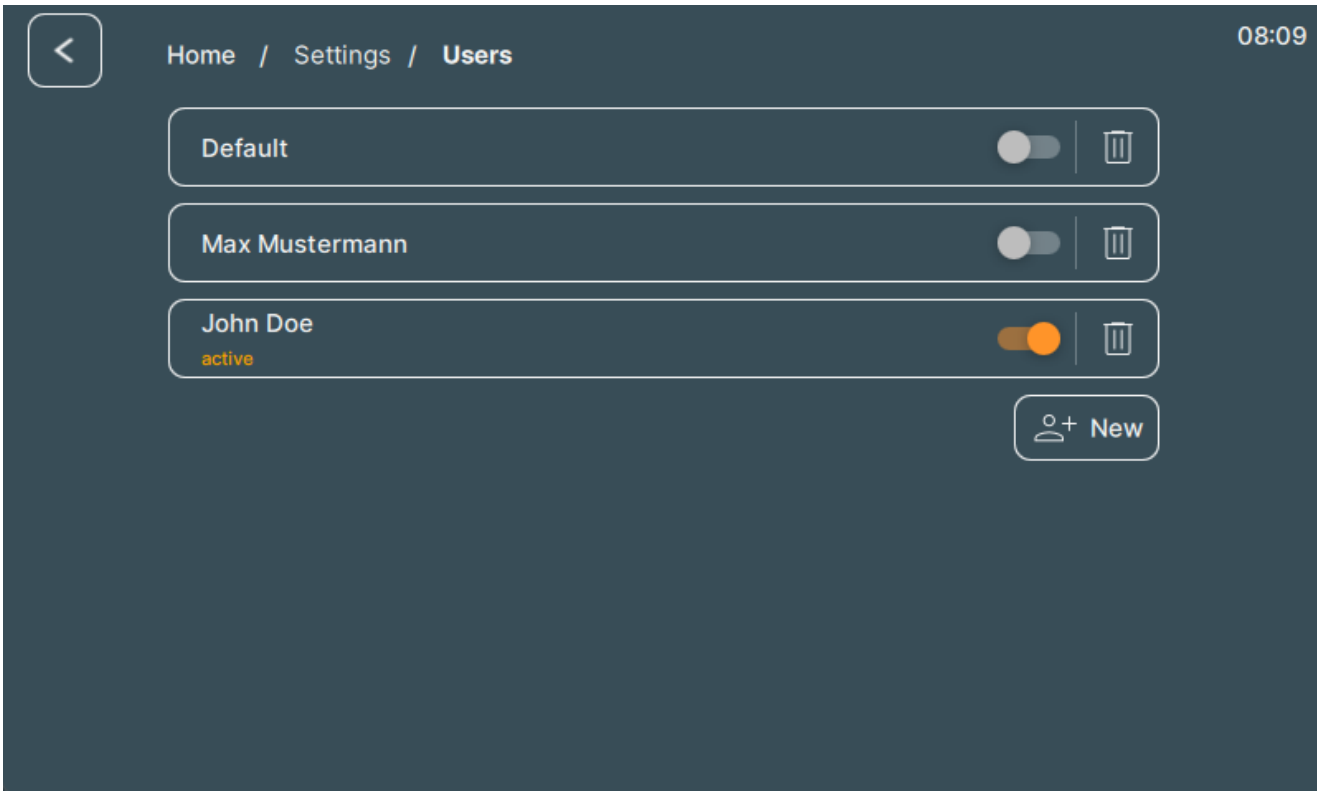
The master password may be requested from SONOTEC GmbH. For requesting a master password, some details are necessary for identity verification. They can be retrieved as follows:

1. After switching on, tap on the "Info" icon in the setting menu.

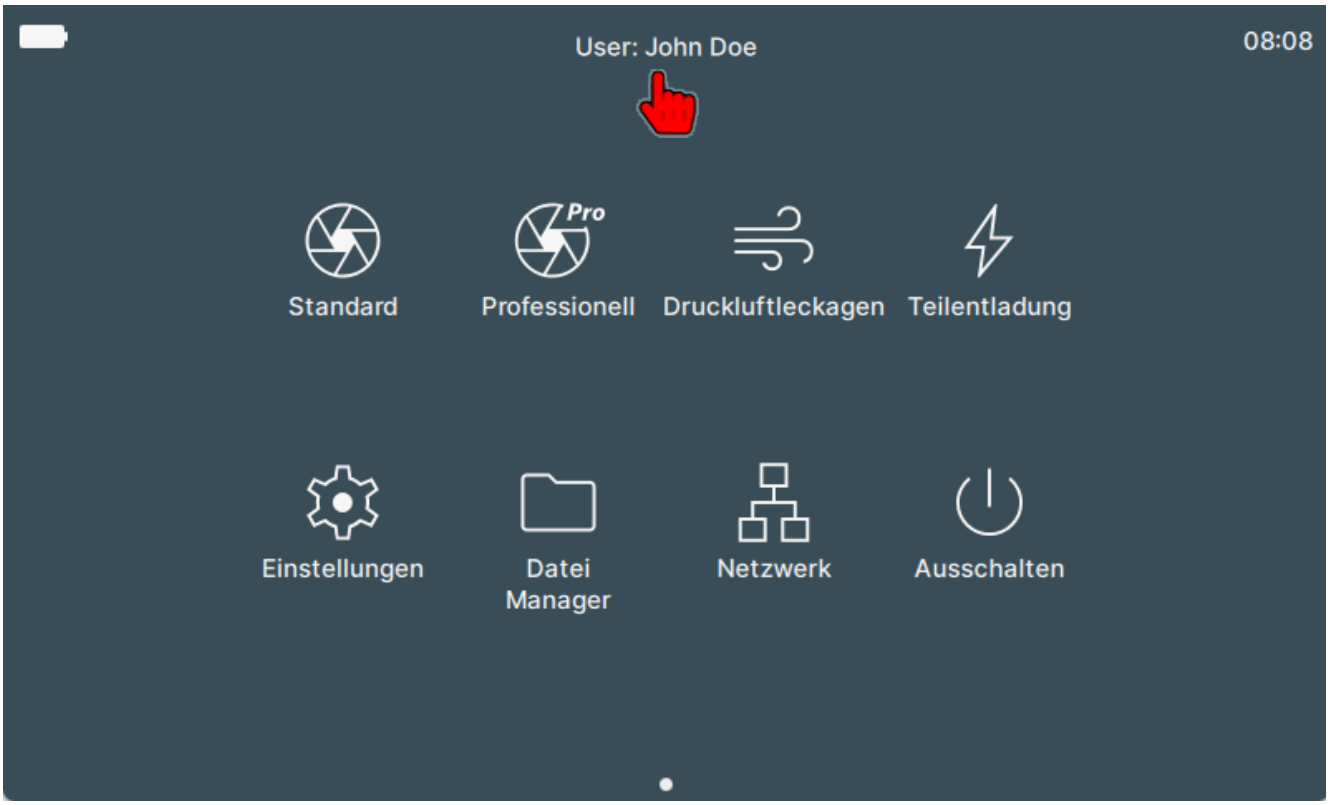
   ☐ A dialog windows with hints for recovering the password and the following details for identity verification opens:

   - Mac Address
   - Date

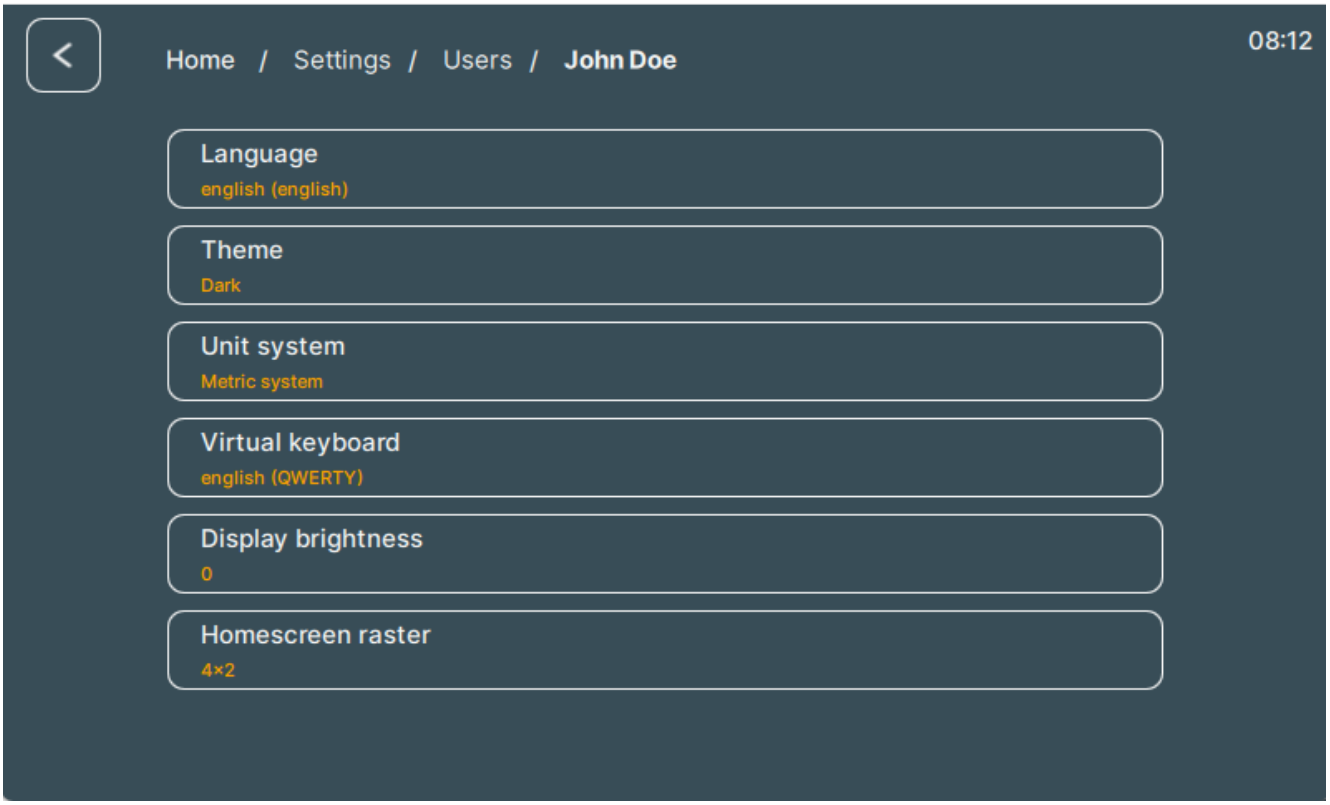
### 4.2.2 Users




The user profiles can be managed in the Users menu. This means that new user profiles can be created, deleted or existing ones can be adjusted. The selected profile is displayed on the home screen:



The following parameters can be set in the user profiles:




Language
The preferred language can be selected here.

Color scheme
Here you can choose between the light and dark color scheme.

System of units
Here you can choose between the metric and imperial system of units.

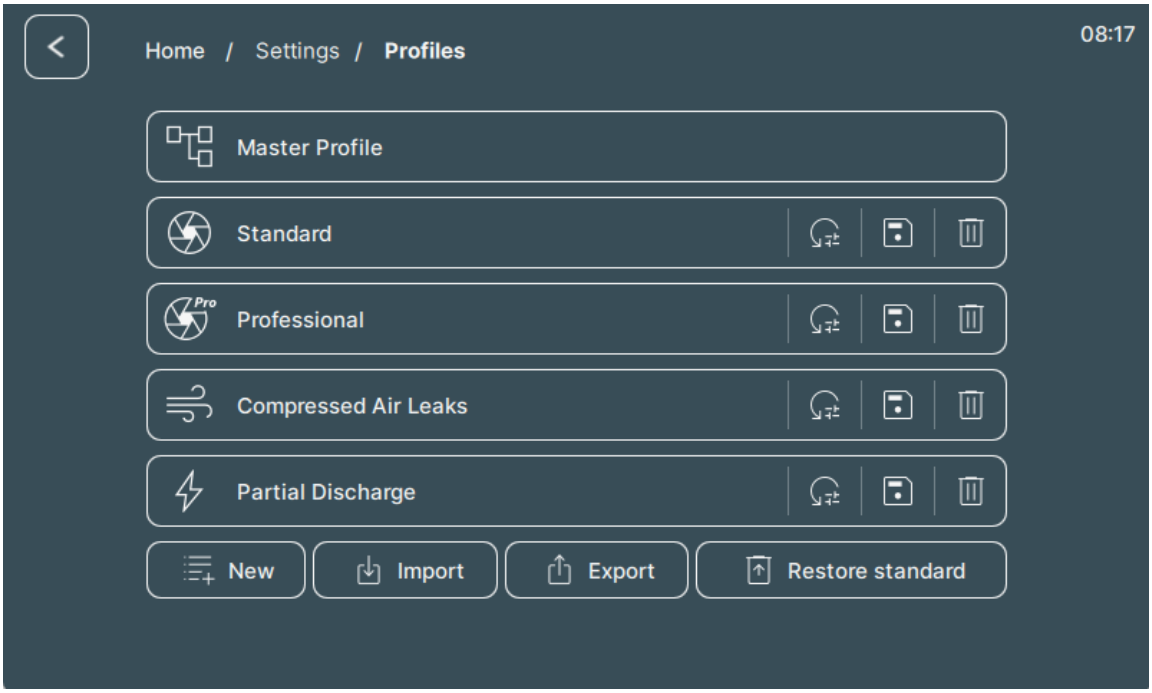
Virtual keyboard
The type of virtual keyboard can be customized here.

Display brightness
The display brightness can be adjusted here.

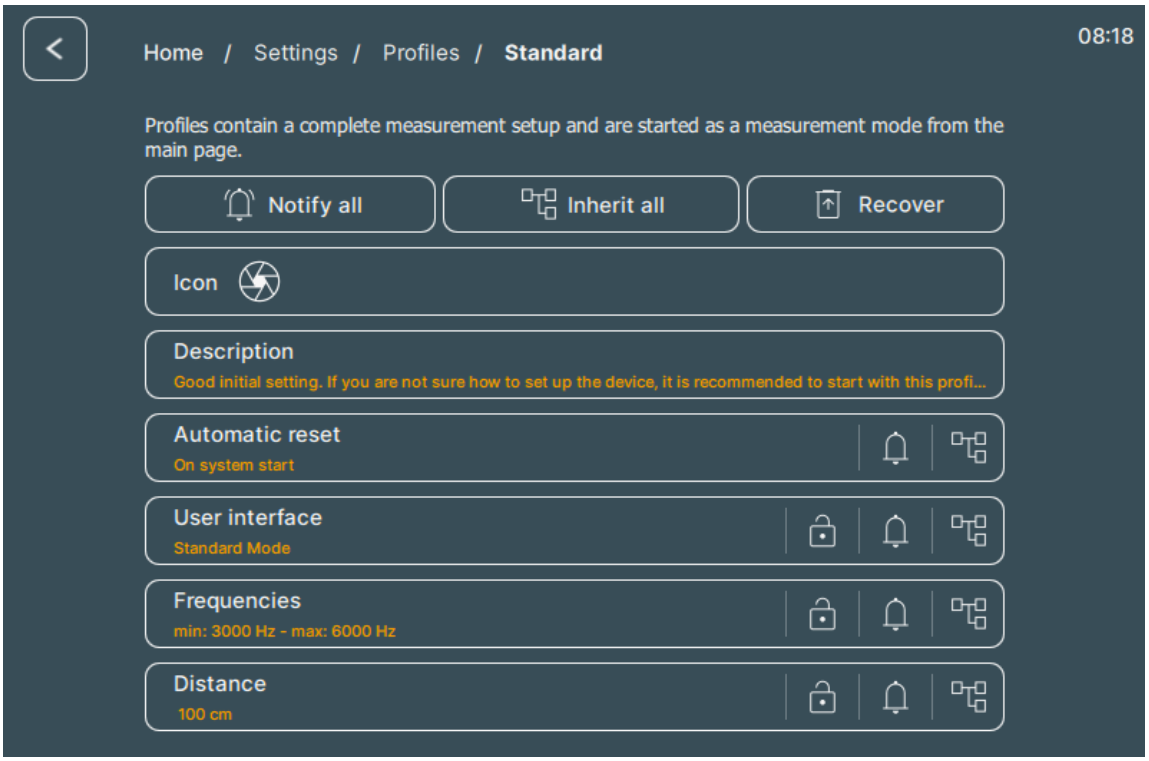
Home screen grid
Here you can customize the layout for the arrangement of the icons on the home screen

### 4.3.3 Profiles

In the Profiles menu, the existing measurement profiles can be edited, new one can be defined, reset to the default settings or deleted:




In den Messprofilen können die folgenden Parameter eingestellt werden:



### Icon

Here you have the option of defining the start screen icon.

### Description

A short description of the measurement profile can be stored under the “Description” menu.

### Automatic reset

The “Automatic reset” function allows you to define whether and when the measurement profile should be automatically reset to the default settings.

### User interface

The “User interface” menu allows you to customize the basic layout of the user interface in the measurement menu.

### Frequencies

The minimum and maximum frequency can be set under the “Frequencies” menu.

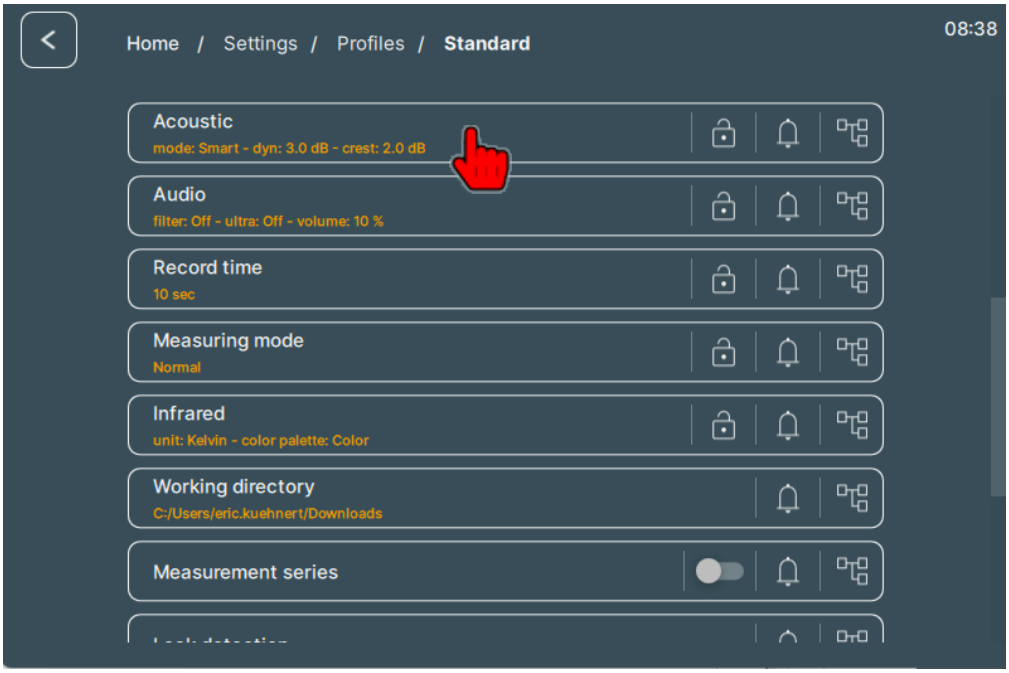
### Distance

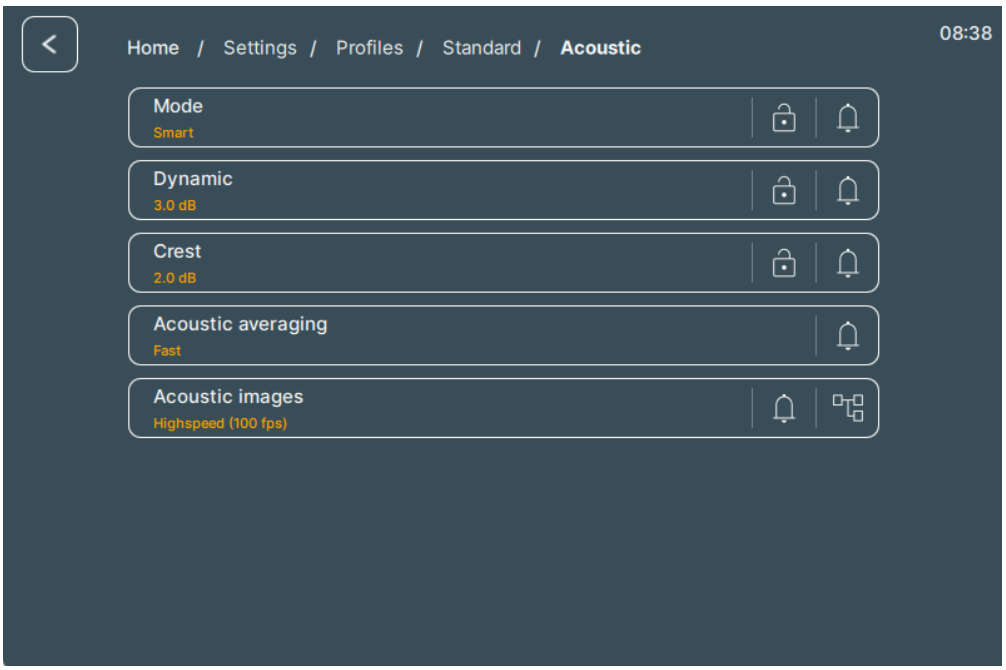
The standard distance to the measuring point can be defined under “Distance”. This can be adjusted during the measurement. To identify sound sources of unknown origin, it is not important to specify the exact distance.
To precisely locate an identified sound source, the distance to the sound source must be set as accurately as possible.
Values in the range from 10 cm to ≥ 2000 cm can be set for this. For sound sources further away than 20 m, the maximum value (≥ 2000 cm) must always be set

### Acoustic

The acoustic image or the infrared image help to determine, analyze and evaluate sound signals or infrared signals. Scaling and dynamics are used to determine the representation of the sound signals or infrared signals.

Helpful parameters can be set in the “Acoustics” menu.



**Mode**
The mode refers to the available scaling modes.

| Scaling mode | Description |
|---|---|
| Auto | In “Auto” scaling mode, the sound source that generates the strongest level in the set frequency band is displayed.<br>Depending on the set dynamic range, the following colors are assigned to the image areas:<br>White = Upper limit (maximum level from the measurement)<br>Black = Lower limit (maximum level from the measurement minus dynamic range) |
| Smart | The “Smart” scaling mode enables background noise to be suppressed, resulting in a diffuse image.<br>The level of the background noise is continuously determined and increased by the crest value (adjustable between 5 and 15 dB). This results in the dynamic threshold value.<br>If the level in the selected frequency range exceeds the dynamic threshold value, the acoustic image is displayed as in the “Auto” scaling mode according to the set dynamic range.<br>“Auto” scaling mode, the acoustic image is displayed according to the set dynamic range. Otherwise, the dynamic threshold value is interpreted as the maximum level. Subtracting the set dynamic range results in the threshold below which the signal is not visible in the acoustic image.<br>To ensure that the displayed dynamic range does not extend into the background noise, the crest value should always be greater than the dynamic value |
| Off | The “Off” scaling mode enables comparisons to a reference level.<br>The maximum of this reference level can be set manually or is determined automatically as follows:<br>• Record measurement: Maximum value of the last 10 seconds<br>• Analyze measurement: Maximum value of the entire measurement |

### Dynamics

The dynamics at the start of a measurement can be adjusted here.

### Crest

The crest factor, which has a direct influence on the dynamics, can be set here. The crest factor provides support when the amplitude (volume) of the signal fluctuates.

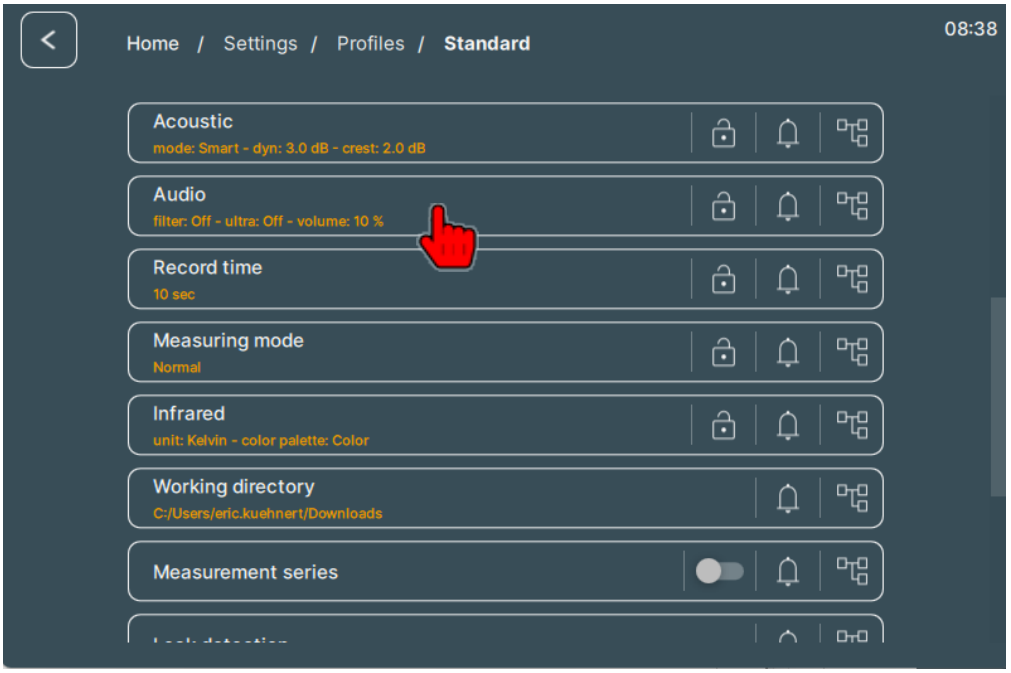
### Acoustic averaging

In acoustic averaging menu, you can select the options: “Fast”, “Slow” or “Pulse”.

### Acoustic images

In Acoustic images menu, you can choose between 50 images and 100 images per second.

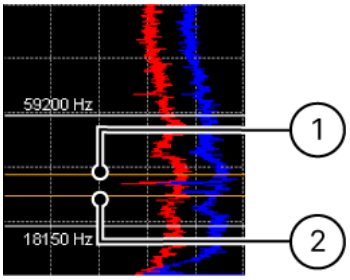
### Audio




Detected sound signals are visualized in the acoustic image and can also be listened as sound via the device's headphone output. Listening enables the sound sources to be distinguished and the sound source sought to be recognized.
The sound output focuses on the center of the field of vision in the acoustic image. The sound signals generated at this point are distinguished from the ambient noise.

### Filter

Activate/deactivate the audibility of the ultrasonic signal by frequency modulation with a bandpass filter of 8 kHz.
After activation, the bandpass filter can be positioned to the desired range using the right-hand slider. The upper (1) and lower (2) cut-off frequencies are displayed with lines in the spectrum for visualization purposes.

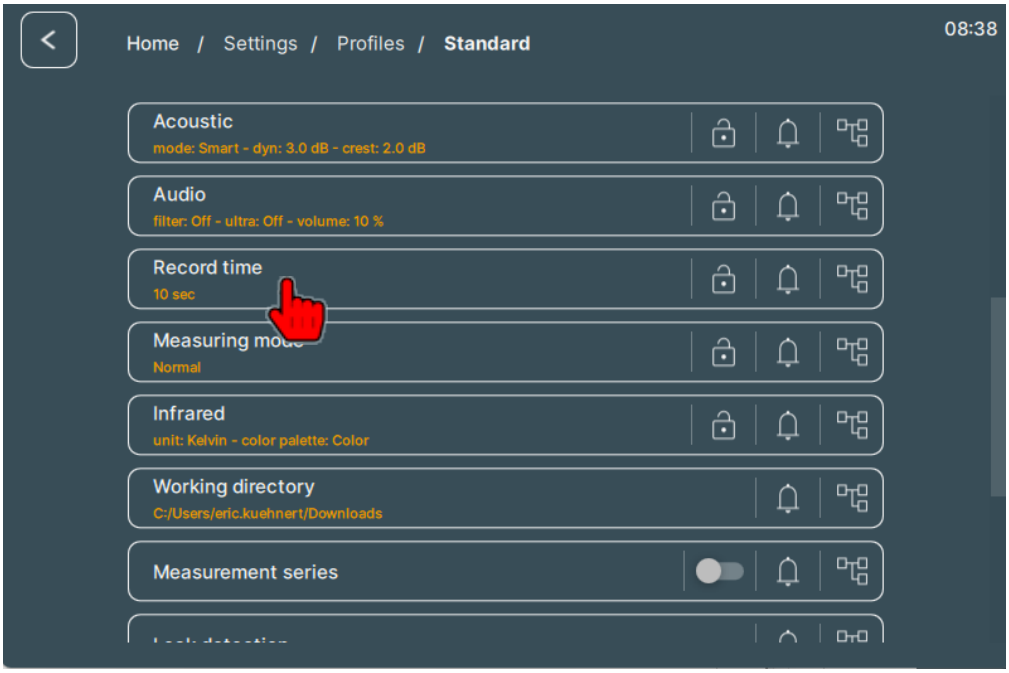



### Volume

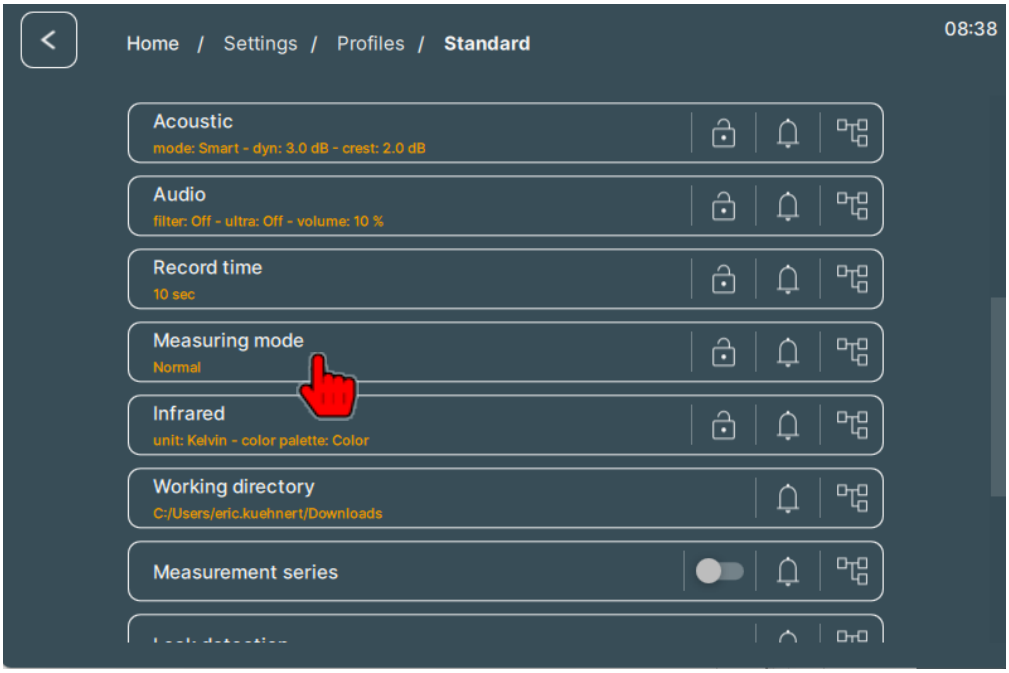
The default volume setting can be adjusted here.

### Recording time

The recording time determines the recording period for a measurement. The longer the measurement duration, the more memory is required for a measurement.
The measurement duration of the SONASCREEN 2 is limited to 240 seconds.



## Measuring mode




The measurement modes Normal (up to 24 kHz), Ultra (up to 100 kHz) and Ultra with infrared (100 kHz with infrared measurement) are available.

### Infrared

The unit, resolution and color palette can be set in the infrared settings menu.

### Working directory

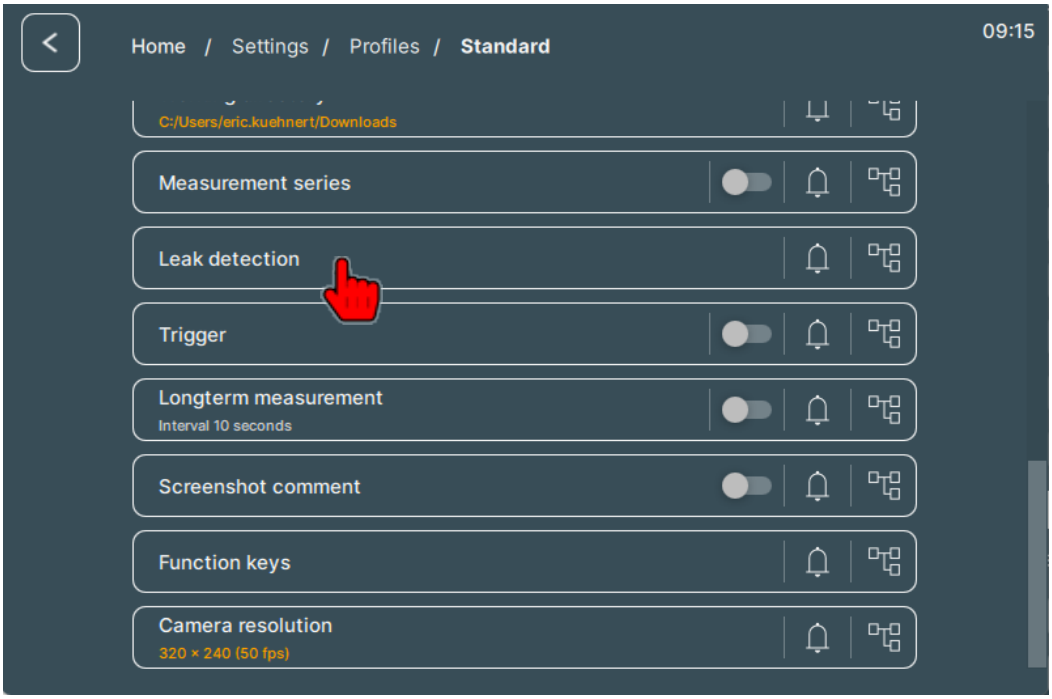
The storage location of measurement data and screenshots is defined here.

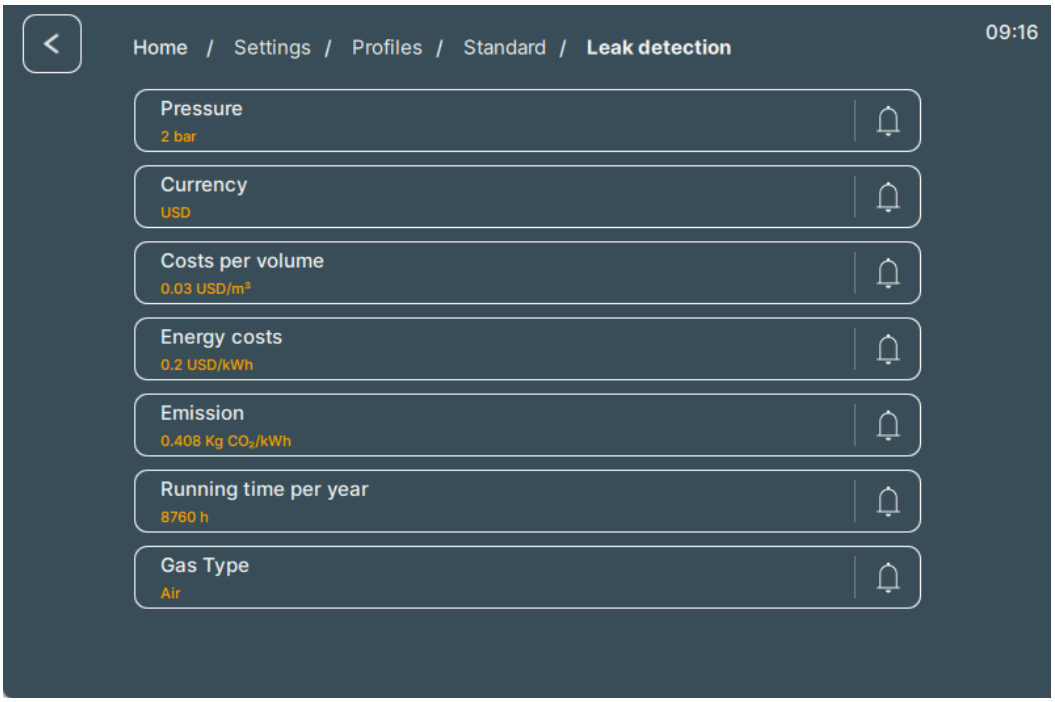
### Measurement series

Here you can select whether measurements should be saved as a measurement series and how it should be named.

### Leakage detection

The necessary parameters for evaluation can be changed in the Leakage detection menu.

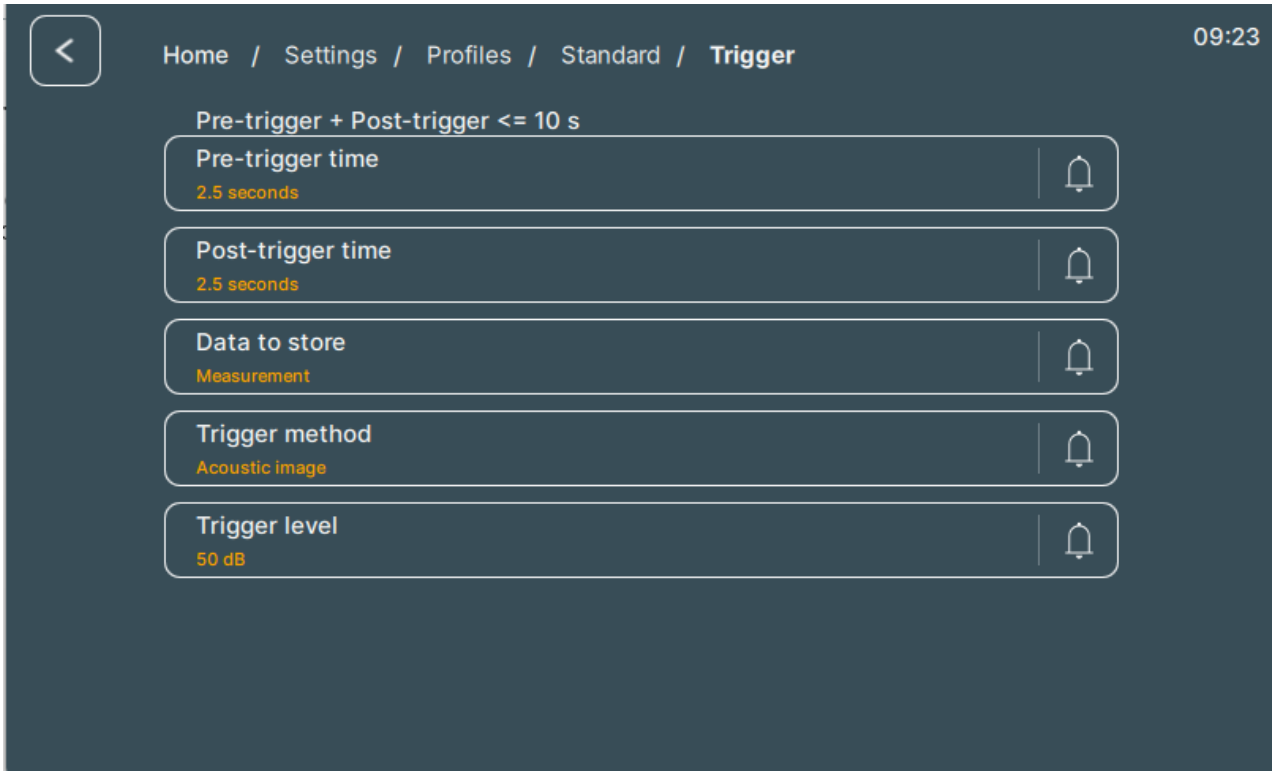


### Trigger

In the Trigger menu, the desired values can be entered in the Lead time, Lag time and Trigger level fields.

In addition, the measurement data to be saved can be selected under “Data to be saved”. A distinction can be made between acoustic image and spectrum in the Trigger method selection list.



**Trigger method "Acoustic Picture"**

In the Acoustic Picture trigger method, the trigger is determined within the acoustic picture. The following parameters may be set:

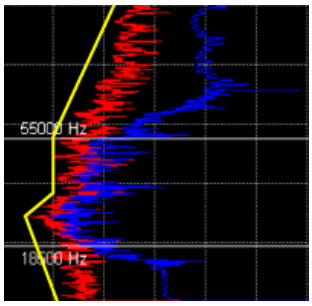
| Parameter | Description/function |
|---|---|
| Pre-trigger time | Duration in seconds before triggering a recording. This duration is part of the section of the current measurement that is to be saved. |
| Post-trigger time | Duration in seconds after triggering a recording. This duration is part of the section of the current measurement that is to be saved. |
| Data to store | Determination of data that are to be saved automatically:<br>• **Measurement:** the measurement data of the set recording time will be saved<br>• **Screenshot:** a screenshot of the current beam picture will be created and saved<br>• **Measurement + Screenshot:** the measurement data of the measurement duration and a screenshot of the current beam picture will be saved |
| Trigger level | Limit value for triggering the recording, in dB.<br>Since the beam picture is the basis of the trigger, the limit value must be within the frequency band defined by minimum and maximum frequency. |

The recording starts as soon as the defined trigger level is reached or exceeded during the current measurement. A marker is automatically set at the start of the recording.
After the defined post-trigger time, a section of the current measurement will automatically be saved. This section contains all data to be saved within the defined pre- and post-trigger time.

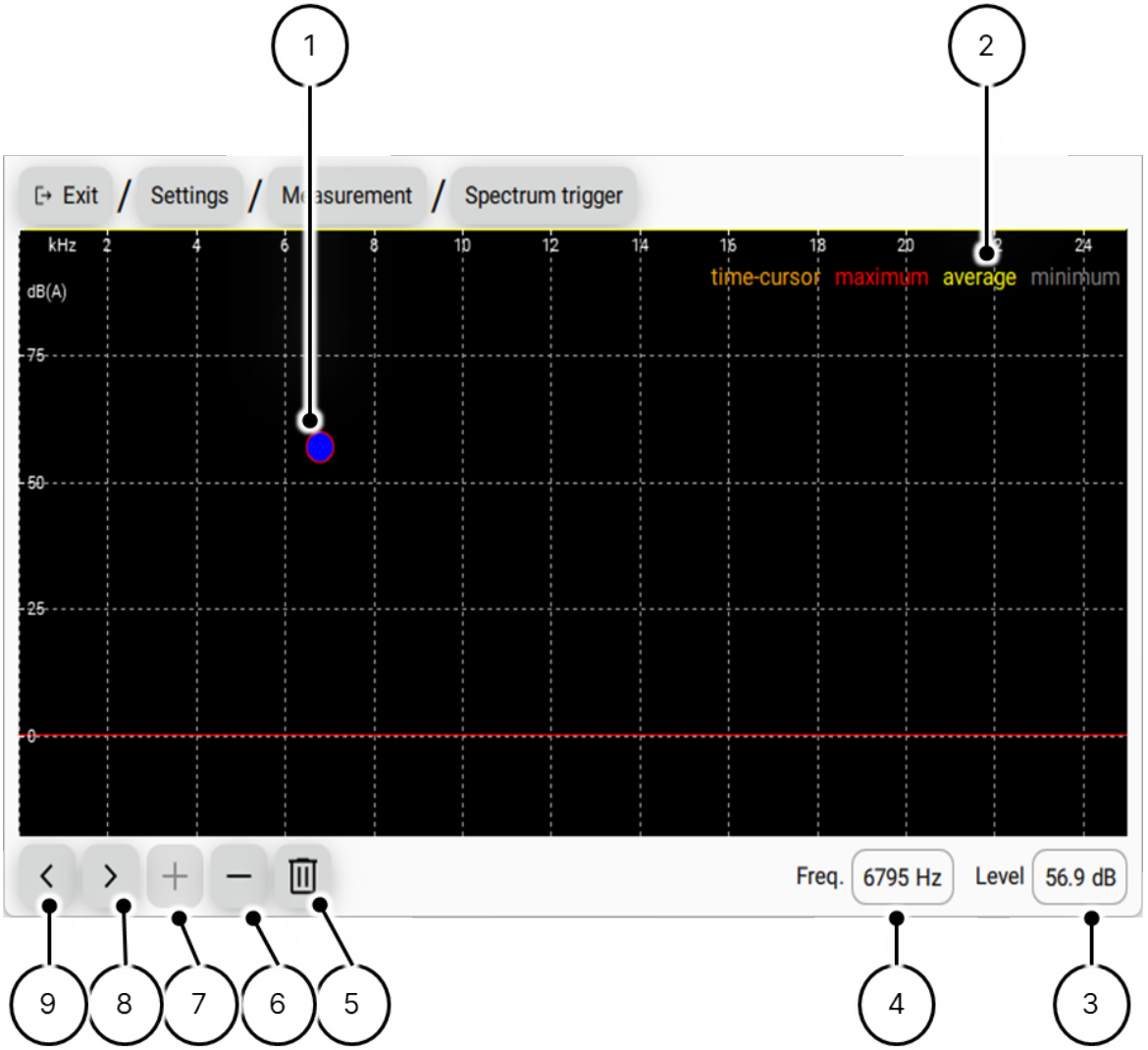
The appropriate trigger level may for instance be determined in a previous measurement.

**Trigger method “Spectrum”**

The trigger settings will be used starting with the next measurement. A yellow indicator line ("trigger curve") is shown in the spectrum. This indicator line indicates the reference spectrum and that the "Spectrum" trigger method is activated



Spectrum" screen



| No. | Type | Description/function |
|---|---|---|
| 1 | Grid point | • Defines frequency and level on a determined position within the spectrum.<br>• May be moved to a different position by tapping and pulling or by entering different values for frequency and level. |
| 2 | Legend | • Shows the designation of the depicted curves.<br>• By tapping a designation, the corresponding curve may be unhidden or hidden within the spectrum. |
| 3 | Level | • Shows the level value of the selected position within the spectrum in dB.<br>• A different level value may be entered by tapping the entry field. |
| 4 | Frequency | • Shows the frequency value of the selected position within the spectrum in Hz.<br>• A different frequency value may be entered by tapping the entry field. |
| 5 | Delete all grid points | • Deletes all grid points within the spectrum. |
| 6 | Remove grid point | • Removes the grid point selected in the spectrum. |
| 7 | Add grid point | • Adds a grid point at the position selected in the spectrum. |
| 8 | Next grid point | • Switches to the grid point after the selected grid point. |
| 9 | Previous grid point | • Switches to the grid point before the selected grid point. |

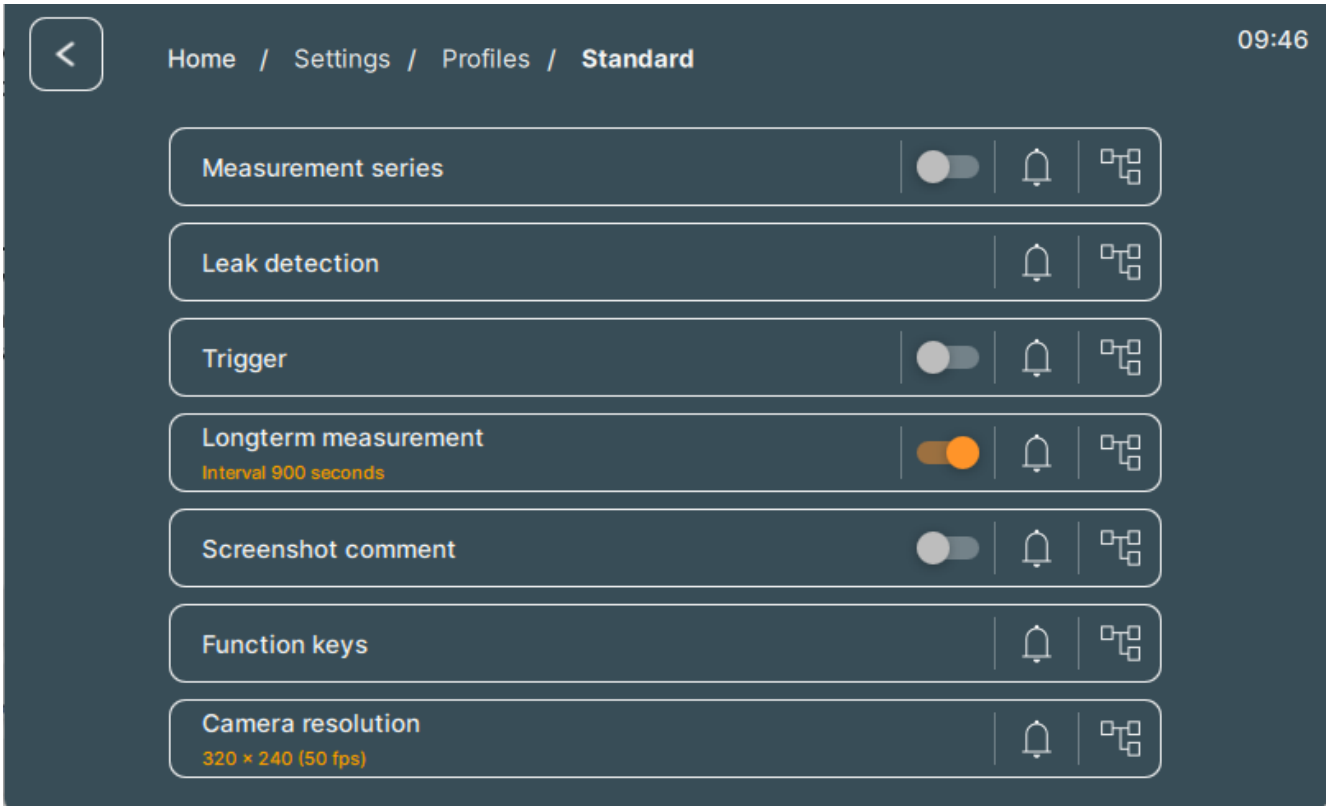
**Using long-term measurement**

In a long-term measurement, the following measurement data will be recorded and saved for a configurable time interval:

- Averaged beam picture (averaged values of the individual beam pictures)
- Acoustic peak hold image (maxima of the individual beam pictures)
- Averaged spectrum
- Peak hold spectrum (maxima)
- Camera image

The representation of the measurement data in the beam picture and the spectrum may be customized. The time interval may be set for a range between 10 to 900 seconds.

A measurement data file will be created for a long-term measurement. All measurement data recorded during the time intervals will be saved in the measurement data file.

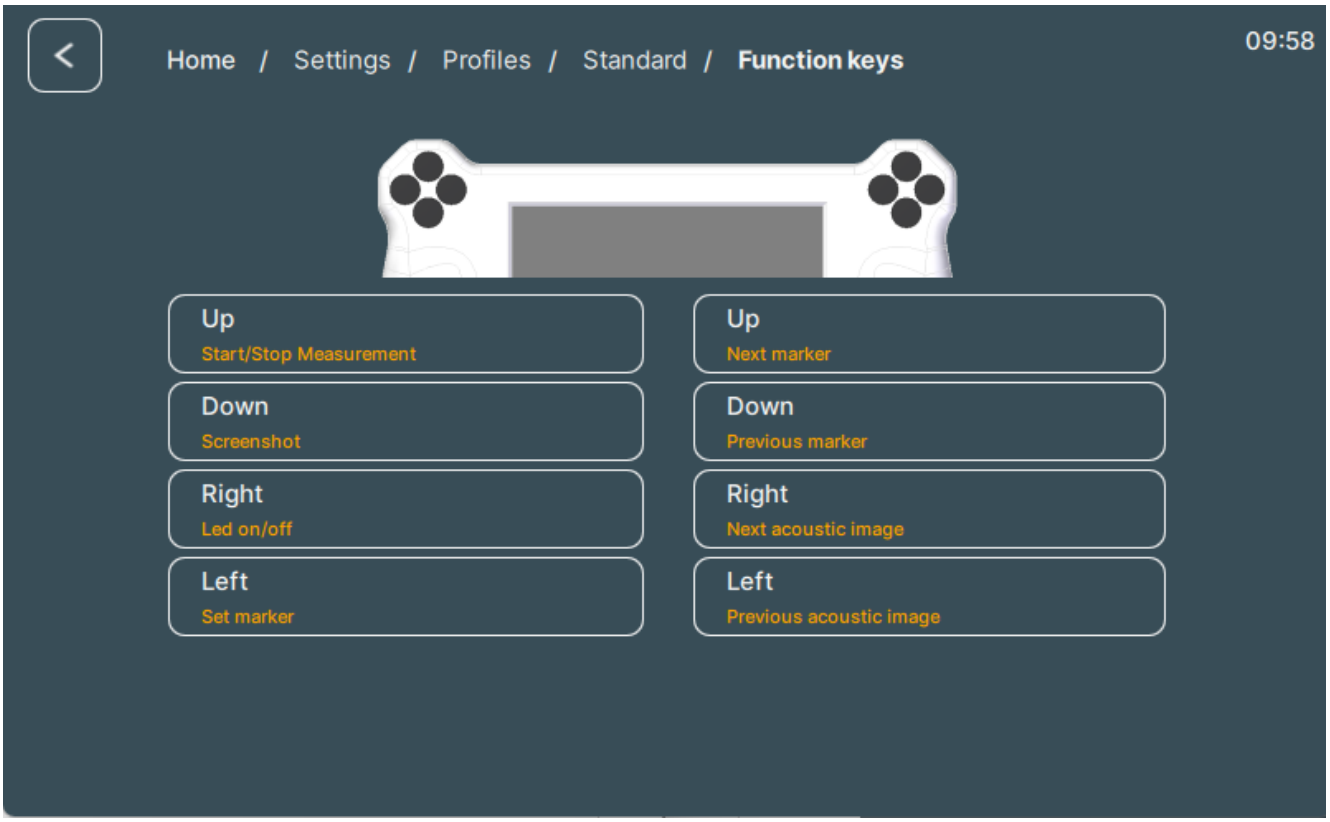



**Activate/deactivate the creation of comments for screenshots.**

Tap in the comment box in the Screenshots field to activate the creation of comments for screenshots.

**Customizing function keys**

All eight function keys of the device offer functions preconfigured by the manufacturer.



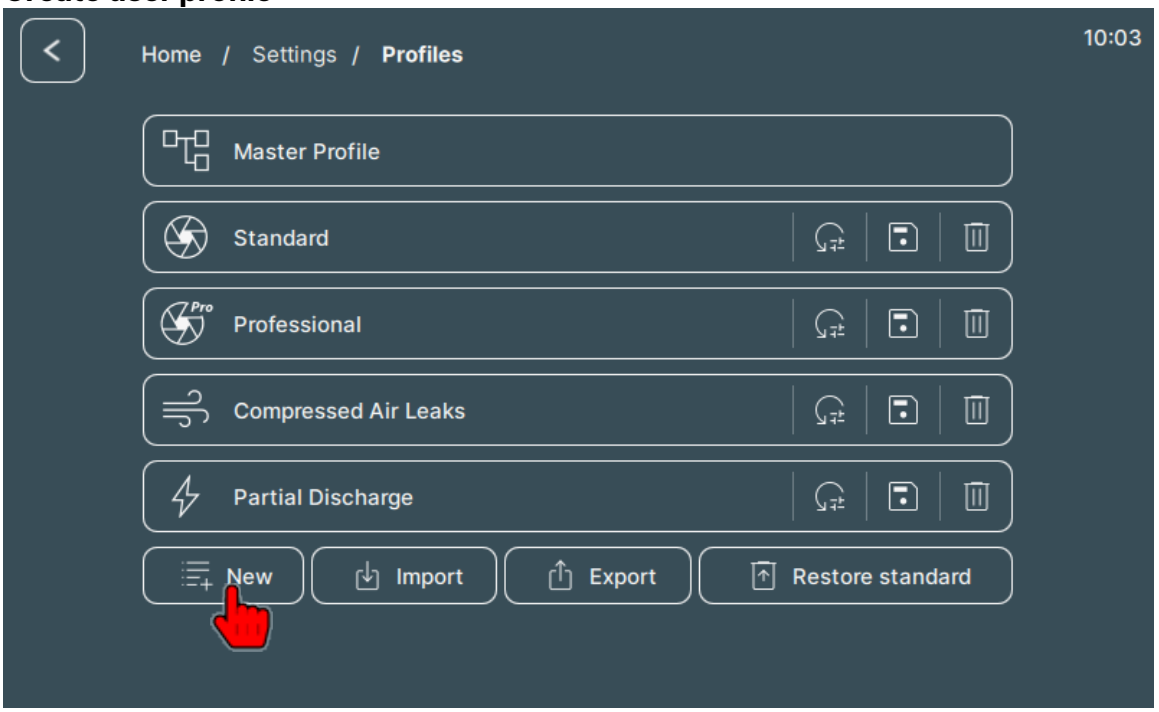

Each function key may be customized with predefined functions. Generally, the following functions are available:

- Start/Stop Measurement
- Led On/Off
- Sound (Un)Mute
- Sound Volume Up
- Sound Volume Down
- Set Marker
- Next Marker
- Previous Marker
- Next Beam-Pic
- Previous Beam-Pic
- Play/stop Recording
- Screenshot
- Photo

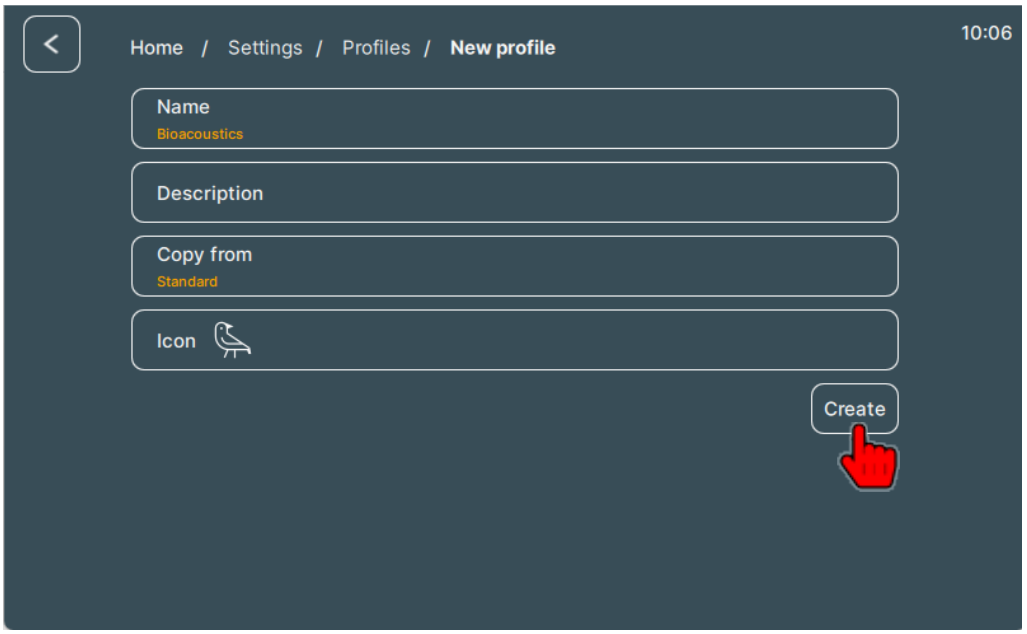
Availability of the functions depends on the used application.

**Camera resolution**
The options 320 x 240 (50 fps) and 640 x 480 (16 fps) are available here.

**Create user profile**




1. Tap the “New” button in the “Profiles” menu.
2. The New profile dialog box opens.
3. You can now assign a name, a description and an icon, which will appear as an icon on the start screen.
   You can also copy the settings from an existing profile.



**Delete user profile**

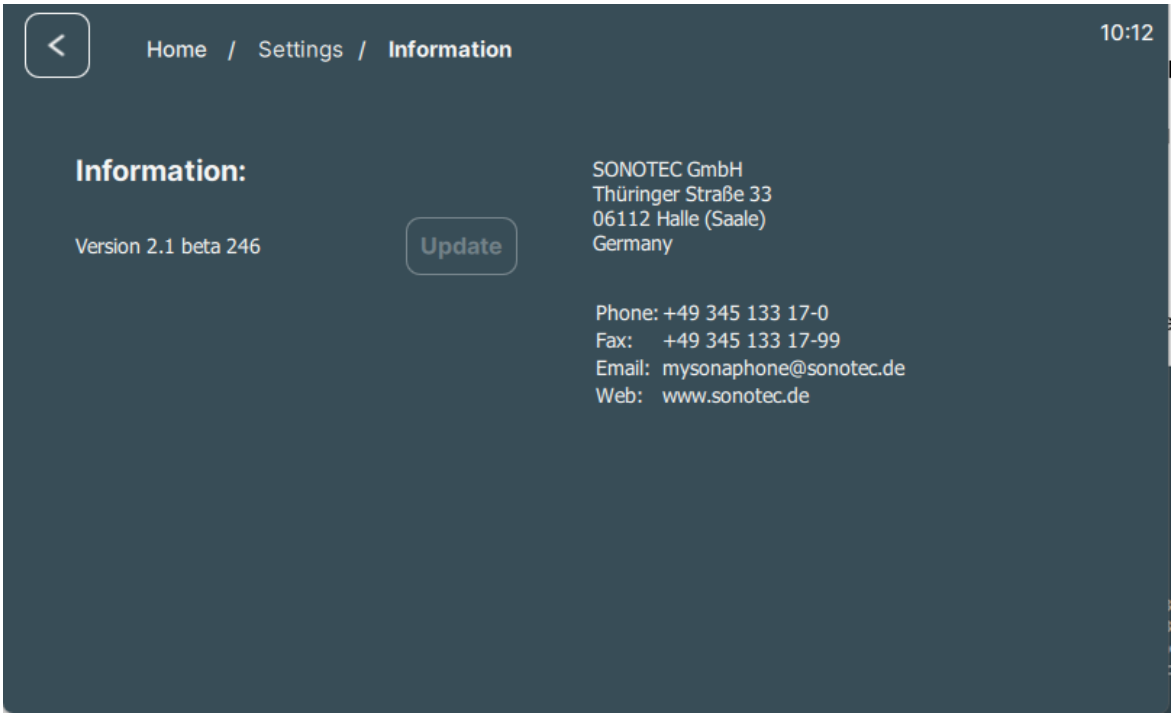
**CAUTION**

When a user profile is deleted, the saved configurations and measurement settings are also deleted along with the user profile.

- Before deleting a user profile, make sure that it can be deleted.

1. Select the desired user profile in the “Profiles” menu
2. Tap the Delete button.
1. A dialog box opens with a confirmation to delete the selected user profile.
2. Tap the Yes button.
3. The user profile is deleted.

**Information**
In the Information menu you can see the camera data such as the firmware version.



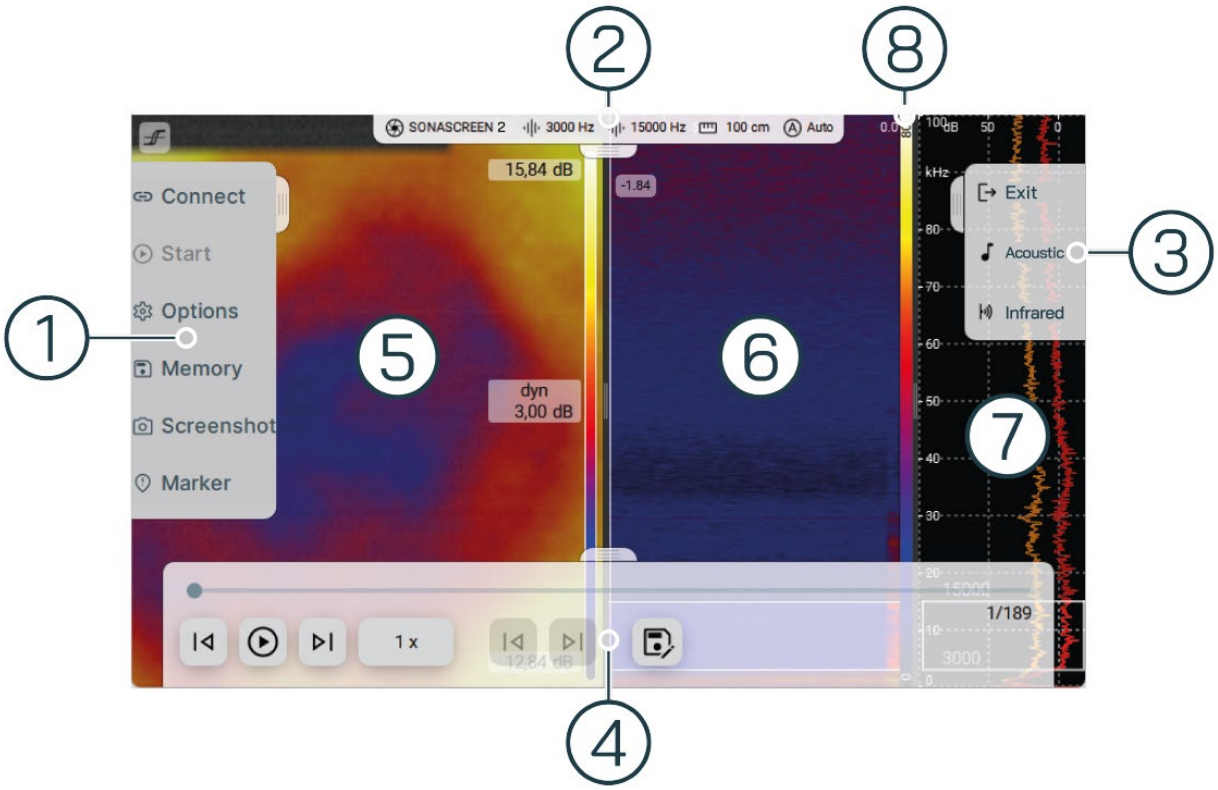

A new software update can also be installed in this menu.

The procedure for this is explained in the “Maintaining the system” chapter.

You will find information about your sales partner on the right-hand side of the screen.

## 4.3 User Interface Measurement

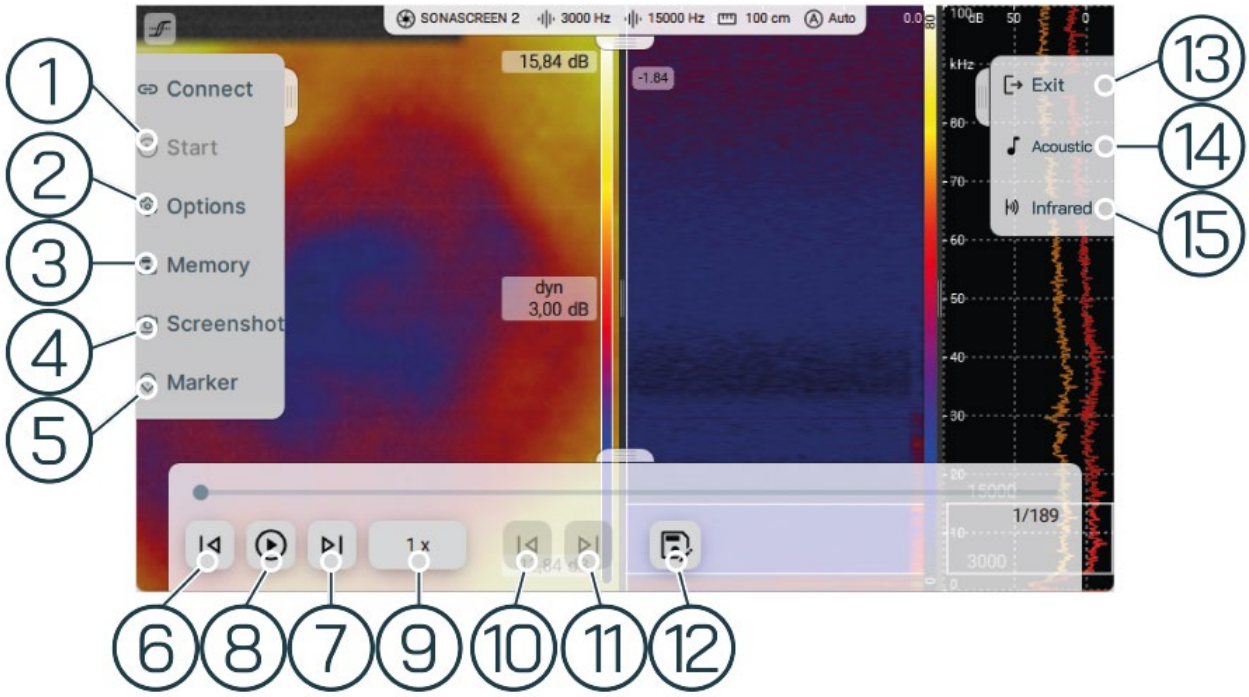
### Screen Pro Mode




| No | Type | Description / Function |
|---|---|---|
| 1 | Left Menu/Slider | Includes tools for controlling and managing measurements. Different functions are available depending on the selected measurement mode. |
| 2 | Upper Menu/Slider | Shows information on the device generation used and set parameters. |
| 3 | Right Menu/Slider | Includes functions such as exiting the selected measurement mode and settings relating to scaling, dynamics and the option to switch to infrared mode. |
| 4 | Lower Menu/Slider | Allows you to view saved measurements again. |
| 5 | Acoustic Image | Shows the camera image with visualized sound signals. |
| 6 | Spectrogram | Displays the intensity of the ultrasonic signal in spectra over time. |
| 7 | Spectrum | The frequency spectrum shows the following spectra according to the selected position (Y-square) in the spectrogram depending on the setting:<br>Red: global \| green: averaged \| yellow: peak hold \| blue: local. |
| 8 | Amplitude scale | Displays the assignment of the level values to a color (color ranges in the spectrogram). |

### Functions in the four menus/sliders

A variety of functions are available in the four menus/sliders, which are explained in this section.




| No | Type | Description / Function | Available |
|---|---|---|---|
| 1 | Start | Starts or stops the recording of a measurement. | • Professional<br>• Standard<br>• Compressed Air Leaks<br>• Partial Discharge |
| 2 | Options | • Measuring mode (24kHz/100kHz/100kHz+IR)<br>• Light (on/off)<br>• Recordng time (10/30/60 seconds)<br>• Audio (Ultrasound translation/volume) | • Pro/Standard/Leak/PD<br>• Pro/Standard/Leak/PD<br>• Pro/Standard<br>• Pro/Standard/Leak/PD |
| 3 | Memory | • Save (save data)<br>• Load (call up data)<br>• Video export (editing start/end, delete, export, select storage location, video options, image options, audio options) | • Pro/Standard/Leak/PD<br>• Pro/Standard/Leak/PD<br>• Pro |
| 4 | Screenshot | Creates a screenshot of the “Measurement” screen.<br>• Screenshots are saved in the working directory that is defined for the measurements | • Pro/Standard |
| 5 | Marker | Allows you to manage (navigate, set, delete) markers. | • Pro |
| 6 | Last Image | By tapping the “Last Image” and “Next Image” icons, each individual image of a measurement video can be | • Pro/Standard/Leak/PD |

| | | | |
|---|---|---|---|
| | | analyzed. | |
| 7 | Next Image | By tapping the “Last Image” and “Next Image” icons, each individual image of a measurement video can be analyzed. | • Pro/Standard/Leak/PD |
| 8 | Replay Measurement | Starts or stops the playback of a recorded or opened measurement. | • Pro/Standard/Leak/PD |
| 9 | Playback speed | The playback speed can be selected optionally:<br>• 1.0<br>• 0.5<br>• 0.25 | • Pro/Standard/Leak/PD |
| 10 | Last Marker | By tapping the “Last marker” and “Next marker” icons, you can jump through the previously set markers. | • Pro/Standard/Leak/PD |
| 11 | Next Marker | By tapping the “Last marker” and “Next marker” icons, you can jump through the previously set markers. | • Pro/Standard/Leak/PD |
| 12 | Save Measurement | Saves the measurement on the device. | • Pro/Standard/Leak/PD |
| 13 | Exit | Exits the respective measurement mode and returns to the start screen. | • Pro/Standard/Leak/PD |
| 14 | Acoustics | Selection of various scaling options, dynamics and distance. | • Pro/Standard/Leak/PD |
| 15 | Infrared | Switch to infrared mode. | • Pro/Standard/PD |

## 4.4 Computer software

For the device, two software applications are available that may be installed on Windows computers. This section describes the two software applications.

### 4.4.1 SONASCREEN software

**Description**

The software used on the device is also available as software for Microsoft Windows computers.
The “SONASCREEN” computer software may be used to control the device via a personal computer. Measurements recorded with the device may directly be saved on the personal computer.

By using the computer software, measurements with a recording time of more than 60 seconds are possible.

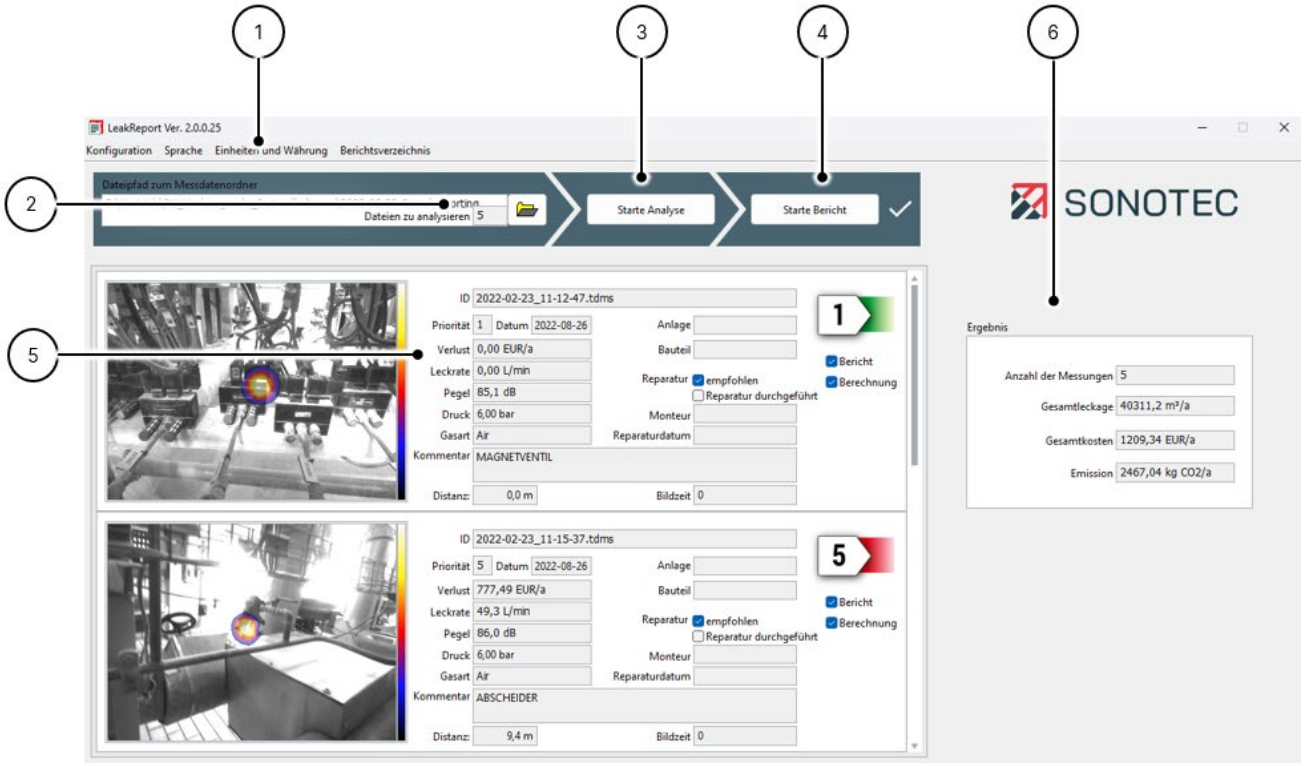
The computer software offers the same appearance and the same functions as the device software.
For using the computer software, the device must be connected to the computer via an Ethernet cable.

## 4.4.2 LeakReport software

### Function

The “LeakReport” computer software is used to generate reports in XSLX (Microsoft Excel) and PDF formats from the measurement data of leakage measurements.

### Structure




### Description

| No. | Type | Description/function |
|---|---|---|
| 1 | Menu | Contains entries with the following options:<br>• **Configuration:** Opens a dialog window for setting report metadata and loss calculation values<br>• **Language:** Opens a dialog window for setting the user interface language<br>• **Units and Currencies:** Opens a dialog window for setting units and currencies<br>• **Excel report template:** Opens a dialog window for selection of the Excel report template |
| 2 | File path to measurement data folder | • Selection of the directory that contains the measurements to be analyzed.<br>• Shows the number of measurements contained in the selected directory. |
| 3 | **Start analysis** | Starts the analysis of the measurements contained in the selected directory. |

| | | |
|---|---|---|
| 4 | **Start report** | Opens a dialog window for:<br>Setting a report name and comment<br>Creating the report<br>The name will be displayed in the header of each report page. The comment will be displayed on the report's title page. |
| 5 | List of leakages | Shows a preview of all measurements contained in the selected directory including analysis results and metadata. |
| 6 | Result | Shows the calculated total result for all analyzed measurements contained in the directory. |

### 4.4.3 PD Report

**Function**
The PC software “PDReport” can be used to create reports from partial discharge measurement data in Excel and PDF file formats.

**Structure**

| No | Type | Description / Function |
|---|---|---|
| 1 | Menu | Contains entries with the following functions:<br>• **Configuration:** Opens a dialog box for setting meta information for the report<br>• **Language:** Opens a dialog box for setting the interface language<br>• **Unit and currency:** Opens a dialog box for setting the unit and currency<br>• **Excel report template:** Opens a dialog box for selecting the Excel report template |
| 2 | File path to the measurement data folder | • Select the directory containing the measurements to be analyzed.<br>• Shows the number of measurements contained in the selected directory. |

| | | |
|---|---|---|
| 3 | **Start Analysis** | Starts the analysis of the measurements contained in the selected directory. |
| 4 | **Start Report** | Opens a dialog box to:<br>• Specify a name and comment for the report<br>• Create the report |
| 5 | List of measurements | Shows a preview of all measurements contained in the selected directory. |
| 6 | Detail evaluation | Shows the detailed evaluation of the measurements with the results of the analysis and meta information. |

# 5. Performing measurements

The device may be used to record measurement data with two differing methods. Apart from measurements suited for differing applications, the devices offer the possibility to specifically record measurement data for leakage measurements.
Depending on the recording method, different controls and measurements settings are available.

Depending on the measurement mode used, different controls and measurement settings are available.

## 5.1 Starting a measurement

**Procedure**

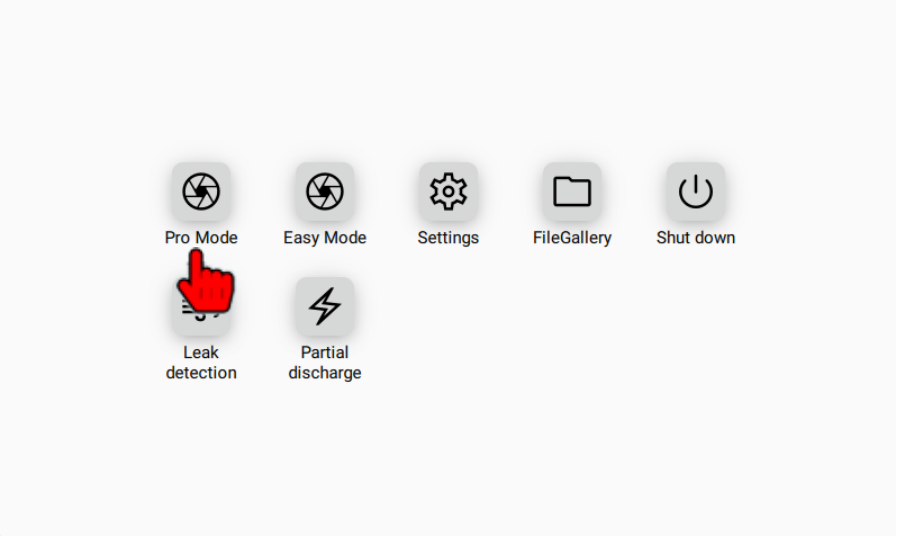
**CAUTION**

Faulty measurement results with connected power supply!

Performing measurements with connected power supply may lead to faulty measurement results.

- Before starting a measurement, please make sure that the device is not connected to the power supply.

1. Open the "Pro Mode" screen.




The device automatically starts measuring in the selected mode.

2. Tap on the “Options” icon and then on “Measurement mode”.

3. Tap on the desired recording mode.
   The measurement is started with the selected recording mode.
   The acoustic image, the spectrogram and the spectrum are displayed.

## 5.2 Starting a leakage measurement

**Description**

Measurements that are started with the “Leakage measurement” recording method are used for detection and documentation of compressed air leakage.
Due to the measurement data that are required for this kind of detection, different controls and measurement settings have to be predefined by the manufacturer and cannot be customized.
Measurements recorded with the “Leakage measurement” recording method may be processed with the “Leak Report” computer software to generate a leakage report.

**CAUTION**

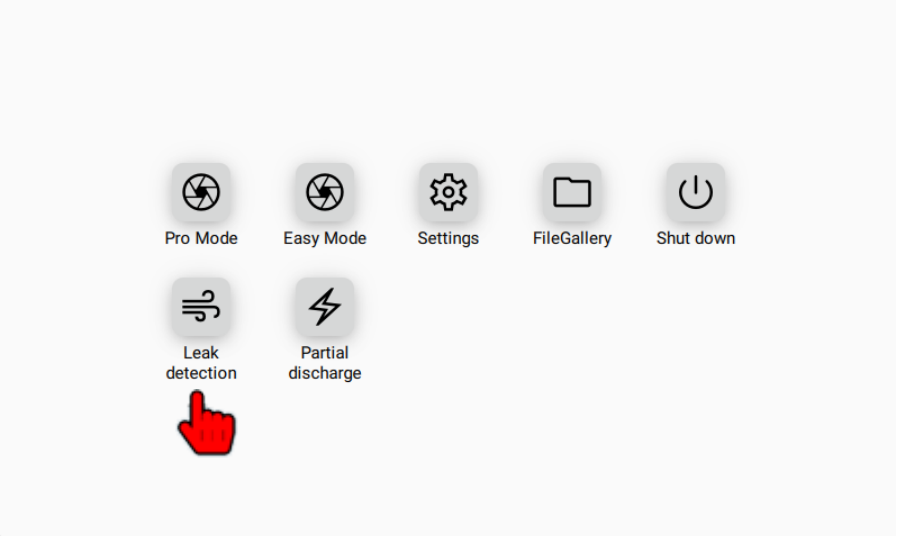
Faulty measurement results with connected power supply!

Performing measurements with connected power supply may lead to faulty measurement results.

- Before starting a measurement, please make sure that the device is not connected to the power supply.

**Procedure**

1. Open the "Leak detection" screen.




2. The measurement starts automatically.

## 5.3 Customizing measurement settings

Depending on the work order, differing measurement settings in the “Measurement” screen may be required or useful for optimized analysis and evaluation of measurement data.

### 5.3.1 Setting the distance from the sound source

**Description**

For identification of sound sources with unknown origin, precise distance designation is not essential.

For precise detection of an identified sound source, the distance from the sound source must be set as accurately as possible. Values may be chosen within a range from 10 cm to ≥ 2000 cm.

For sound sources at a distance of more than 20 m, the maximum value (≥ 2000 cm) must always be set.

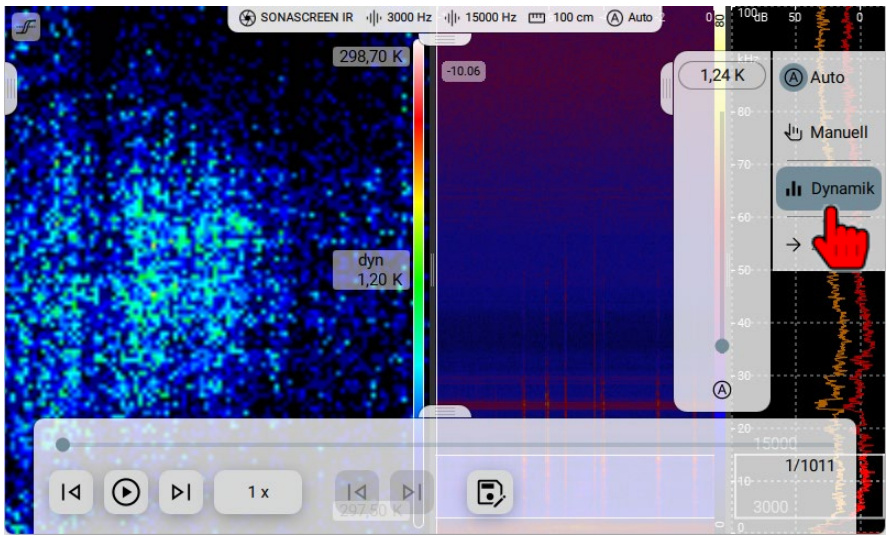
**Procedure**

1. Tap on the “Distance” icon in the right menu/slider.
2. Set the required distance either by the slider or by directly entering it in the input field.

### 5.3.2 Set scaling mode and dynamics

**Description**

The acoustic image or the infrared image help to determine, analyze and evaluate sound signals or infrared signals. Scaling mode and dynamics are used to determine the representation of the sound signals or infrared signals.




The following scaling modes are available, which can provide the required selectivity depending on the quality of the received/recorded signals:

| Scaling mode | Description |
|---|---|
| Auto | In “Auto” scaling mode, the sound source that generates the strongest level in the set frequency band is displayed.<br>Depending on the set dynamic range, the following colors are assigned to the image areas:<br>White = Upper limit (maximum level from the measurement)<br>Black = Lower limit (maximum level from the measurement minus dynamic range) |
| Smart | The “Smart” scaling mode enables background noise to be suppressed, resulting in a diffuse image.<br>The level of the background noise is continuously determined and increased by the crest value (adjustable between 5 and 15 dB). This results in the dynamic threshold value.<br>If the level in the selected frequency range exceeds the dynamic threshold value, the acoustic image is displayed as in the “Auto” scaling mode according to the set dynamic range.<br>“Auto” scaling mode, the acoustic image is displayed according to the set dynamic range. Otherwise, the dynamic threshold value is interpreted as the maximum level. Subtracting the set dynamic range results in the threshold below which the signal is not visible in the acoustic image.<br>To ensure that the displayed dynamic range does not extend into the background noise, the crest value should always be greater than the dynamic value. |
| Manual | The “Manual” scaling mode enables comparisons to be made with a reference level. The maximum of this reference level can be set manually or is determined automatically as follows:<br>• Record measurement: Maximum value of the last 10 seconds<br>• Analyze measurement: Maximum value of the entire measurement |

### 5.3.3 Setting the recording time

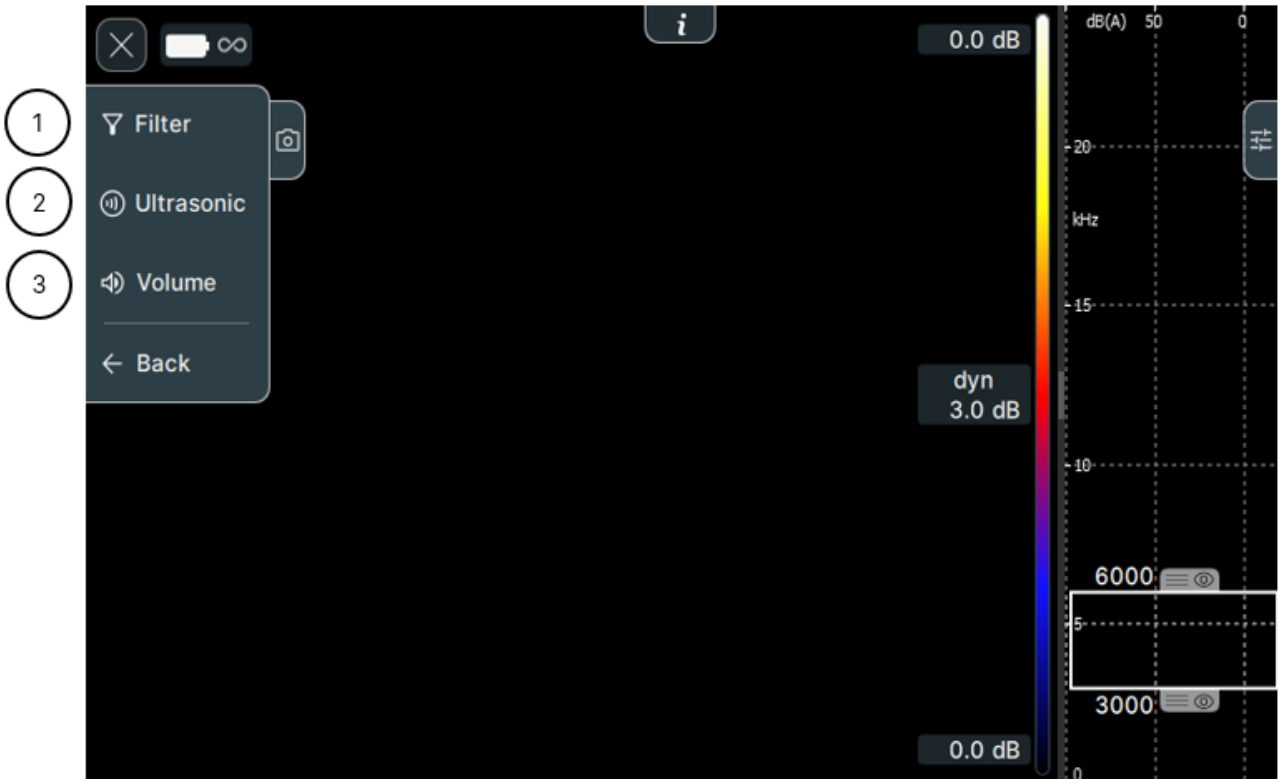
**Description**
The recording time sets the recording duration for a measurement. The longer the recording time, the more storage space is needed per measurement.
The device's internal storage offers 32 GB. This memory size is sufficient for approximately 400 measurements with a duration of 10 seconds or 80 measurements of 60 seconds.
The recording time of SONASCREEN is limited to 60 seconds. If the device is controlled via the computer software, measurements of 180 seconds are possible.

**Availability**
For leakage measurements, the measurement duration is automatically limited to 1 second.

**Procedure**
1 Tap on the “Options” icon in the “Pro Mode” or “Easy mode” screen.
2. Tap on the “Recording time” icon.
3. Select the desired measurement duration in the selection list.

### 5.3.4 Adjusting the audio output

**Description**
The detected sound signals are visualized in the beam picture and may additionally be output as sound via the device's headphone socket. Playback allows for distinction of the sound sources and detection of a particular sound source.
Audio output focuses on the center of the field of view in the beam picture. The sound signals occurring at this position are distinguished from the ambient noise.
The following customizations are available:




| No | Function | Description |
|---|---|---|
| 1 | Filter | The audio output and the local spectrum are filtered according to the set lower and upper cut-off frequency. When deactivated, the audio signal is played back unfiltered. |
| 2 | Ultrasound | Audio output is activated or deactivated. |
| 3 | Volume | The volume can be continuously adjusted here. |

### 5.3.5 Create Screenshot

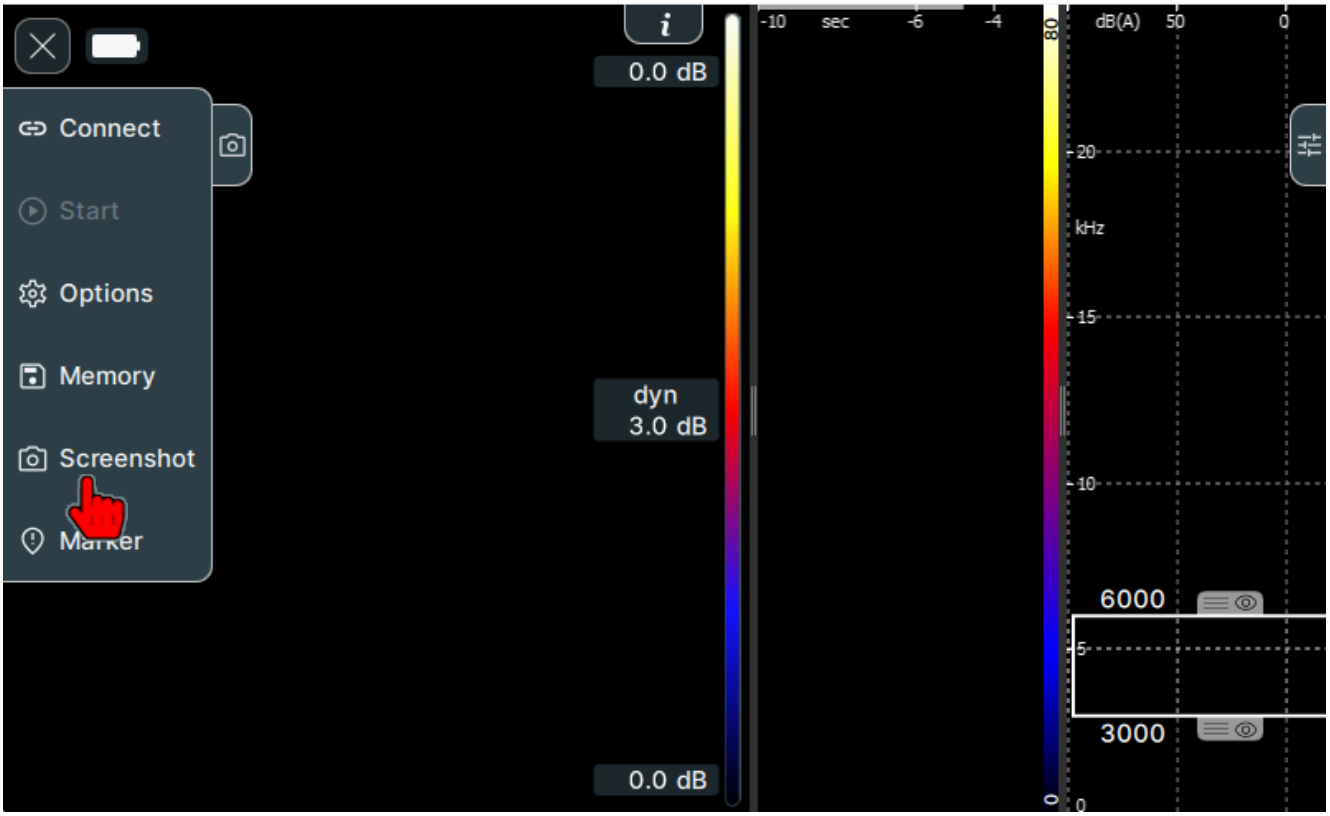
**Description**
During recording or analyzing measurements, screenshots may be taken. These screenshots may be used for documentation of measurements and/or procedures.
A screenshot saves the display view with its current layout.
Screenshots are saved in PNG format within the working directory and may be transferred from the device to a personal computer by using a USB storage medium.

**Availability**
It is not possible to create screenshots of leakage measurements.

**Procedure**

1 In the “Measurement” screen, tap the "Take a screenshot" icon.

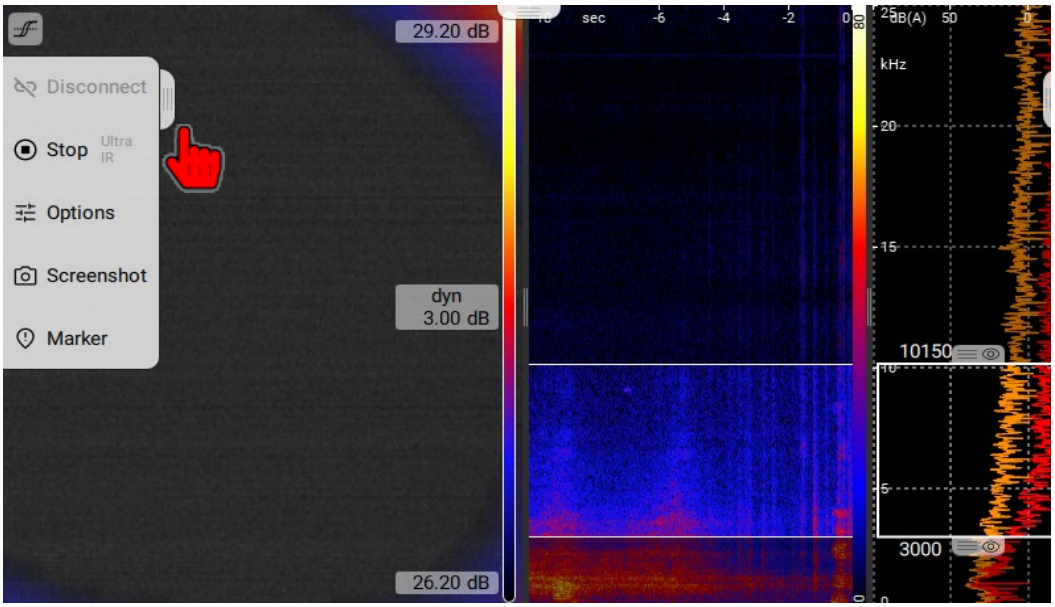
The current layout of the display view is saved as screenshot in the working directory.



### 5.3.6 Ending a measurement

**Description**
During recording a measurement, all measurement data will be cached in the device for the duration of the set recording time. The cached time period is displayed in the spectrogram. This allows for checking and/or analyzing the measurement data either directly during or after ending a measurement.
Recording of a measurement may be stopped at any point in time.

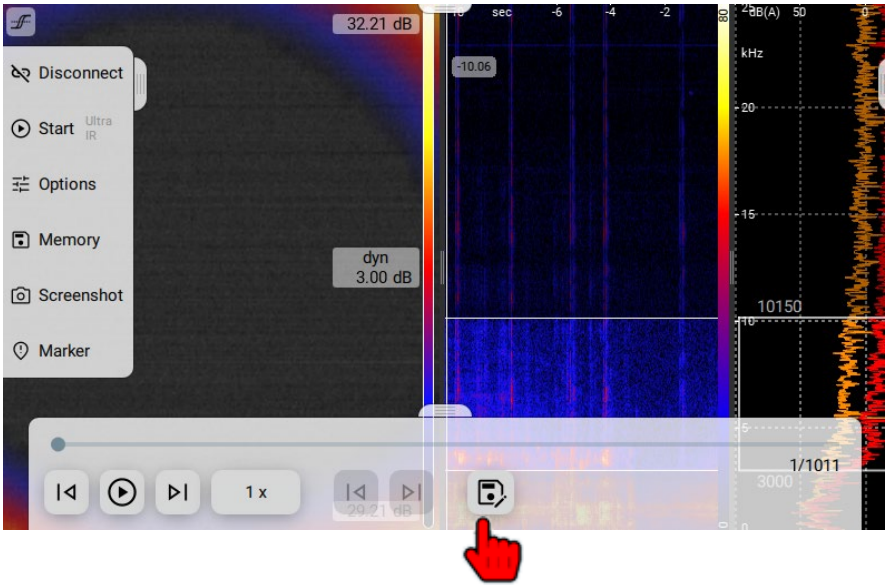
**Procedure**
1. Tap the "Stop" icon.



### 5.3.7 Saving a measurement

**Description**
All measurement data cached after ending a measurement may be saved in a measurement data file in the device. Each saved measurement data file may be opened again at any point in time. This allows for subsequent review and/or analysis of measurement data.

1 Tap the “Save measurement” icon.




### 5.3.8 IR-Messungen

Infrared measurements can be carried out with all measurement modes, i.e. professional, standard and partial discharge and compressed air leakage.

1. Open any measurement mode.
2. The measurement starts automatically. Stop this.
3. Tap on the “Options” icon
4. Tap on “Measurement mode”.
   □ A menu with the available recording modes opens.
5. Tap on the “Infrared” recording mode.
6. You can now start the measurement again via “Start” and switch to an infrared measurement in the right-hand menu/slider via the infrared icon.
7. In the right-hand menu/slider, you can now switch between an infrared measurement and a classic measurement as required.

### 5.3.9 Restoring defaults

When restoring defaults, all currently loaded configurations and measurement settings will be deleted from the device's internal storage.
All created user profiles remain saved and may be loaded again. After restoring defaults, the following device defaults will be reset:

| Configuration/measurement setting | Value |
|---|---|
| Distance | 100 cm |
| Frequency filter | Measurements up to 24 kHz:<br>• Min: 3 kHz<br>• Max: 10 kHz |
| Scaling | • Mode: Smart<br>• Dynamic: 3.0 dB |
| Audio output | mute |
| Recording time | 10 s |
| Beam speed | 100 fps |
| Camera resolution and speed | 320 × 240 (50 fps) |
| Working directory | device's root directory |
| Measurement series | deactivated |
| Function keys | standard configuration |

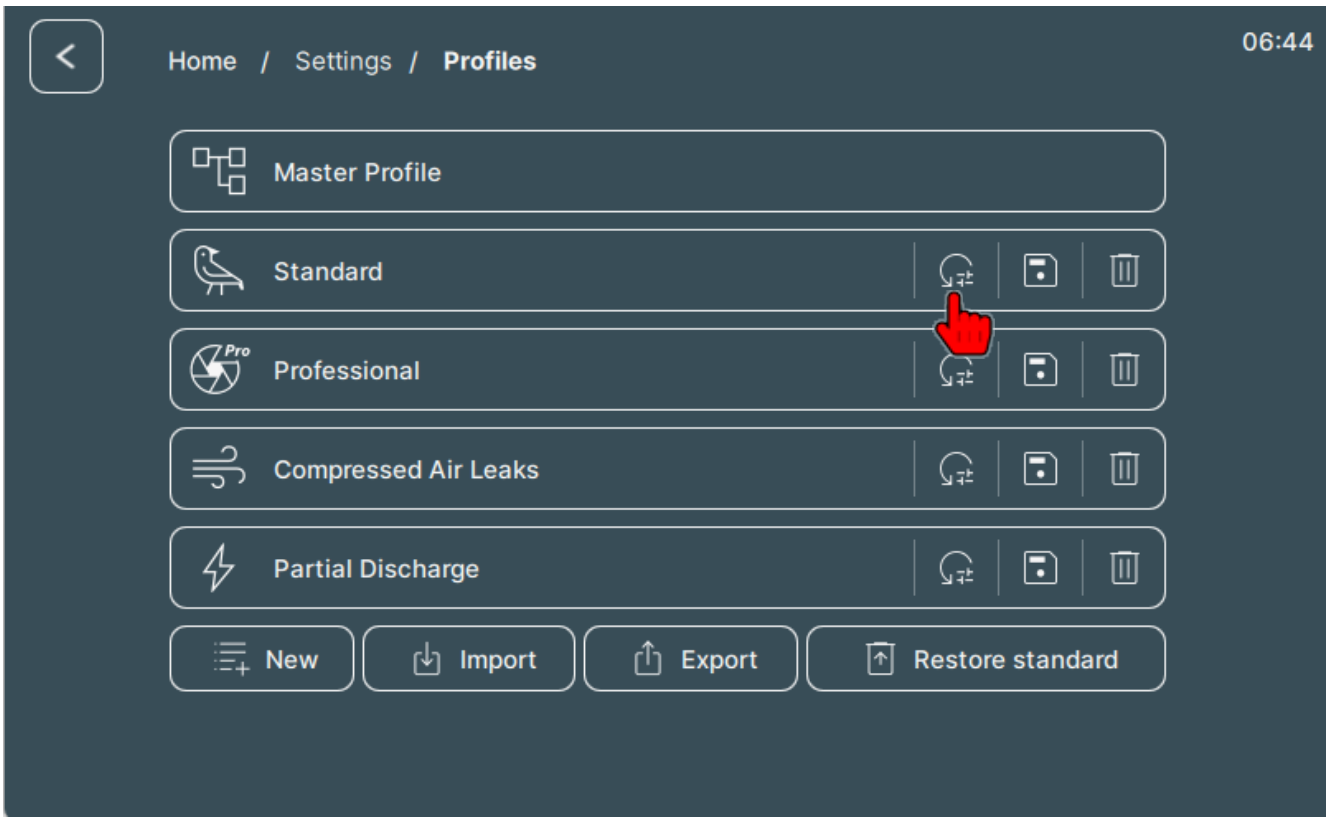
**Procedure**

**ATTENTION**

**Direct reset to factory settings**

The device will be reset to factory settings without confirmation prompt.

1. In the "Choose profile" screen, tap the **Restore Defaults** button.
   ☐ The device is reset to factory settings.



# 6 Concluding a work order

After performing and saving all measurements, these may subsequently be analyzed on the device or edited for further applications (e.g. videos, reports or editing on the personal computer).

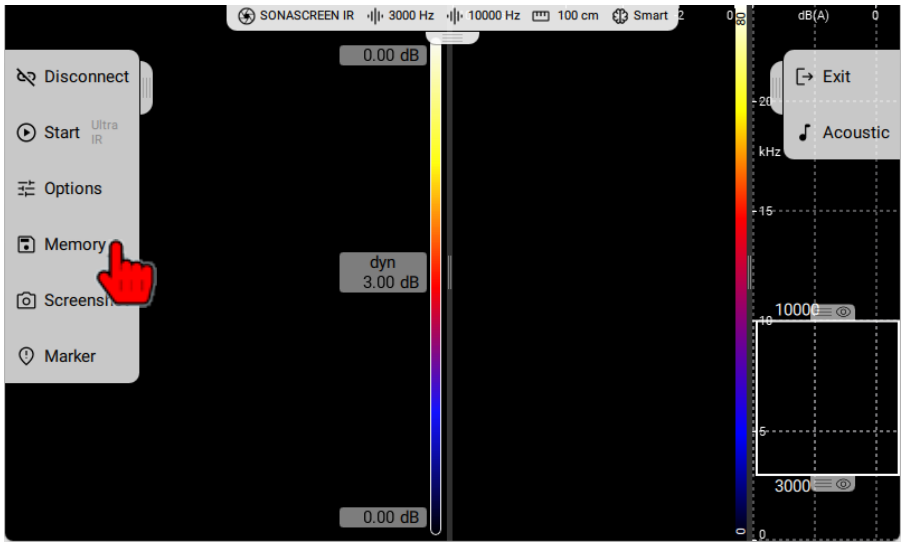
## 6.1 Opening saved measurements

**Description**

The measurements saved in the currently selected working directory may be opened for subsequent analysis.

**Procedure**

1. Tap the "Memory" icon on the "Pro Mode" or "Easy Mode".




2. Tap the Icon “Load”

3. Select the respective measurement

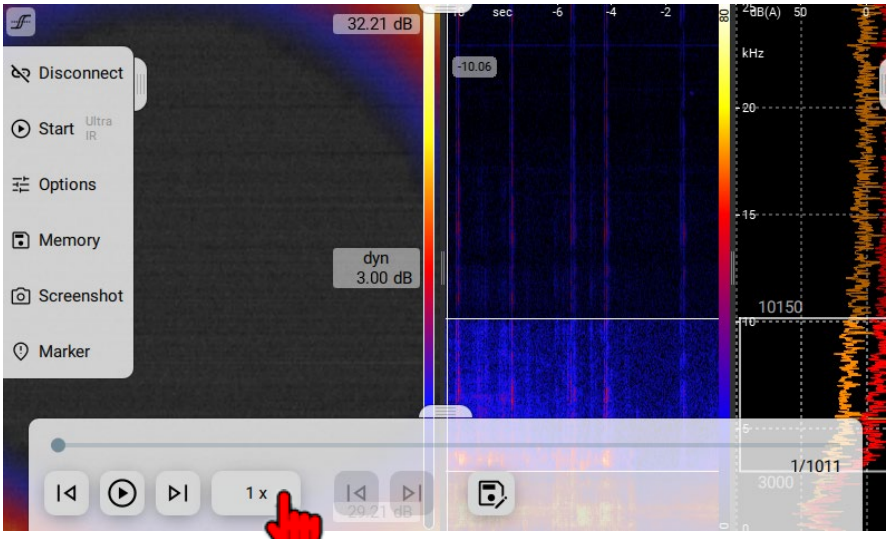
## 6.2 Evaluating measurement results

Measurements can be played back in a range of speeds or in single image steps. This may be helpful for:

- a preliminary evaluation directly after ending a measurement or
- subsequent analysis and evaluation after opening a saved measurement.

**Procedure**

1. In the "Measurement" screen, tap the "speed" icon.




2. A menu with the following playback modes opens:
   - 1x = regular speed
   - 0.25 = 0.25 of regular speed
   - 0.5 = 0.5 of regular speed

3. Tap the icon of the particular playback mode.
   The measurement is played back with the selected speed.

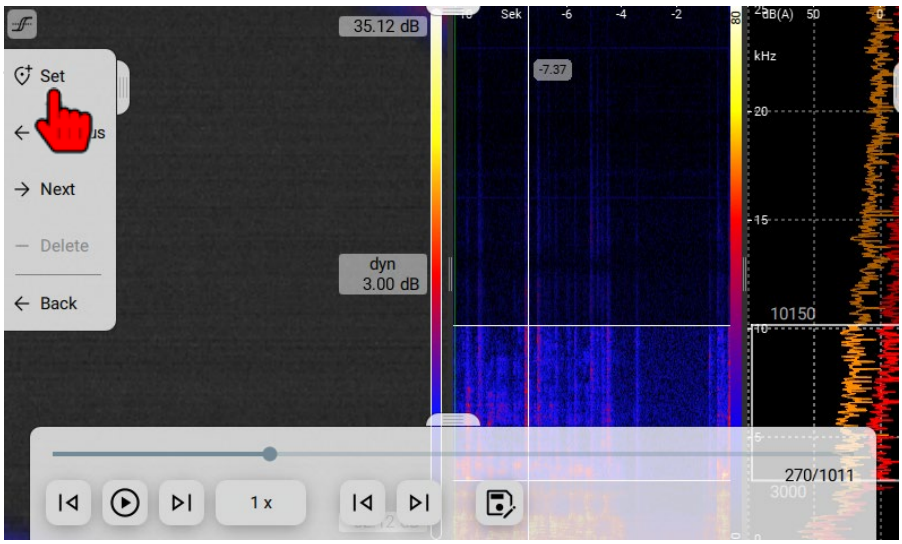
## 6.3 Adding a marker in the spectrogram

**Description**
Markers may be used to indicate acoustic events within a measurement. Markers may be added in the spectrogram:

- during recording of a measurement or
- subsequently in completed or saved measurements.

**Procedure**

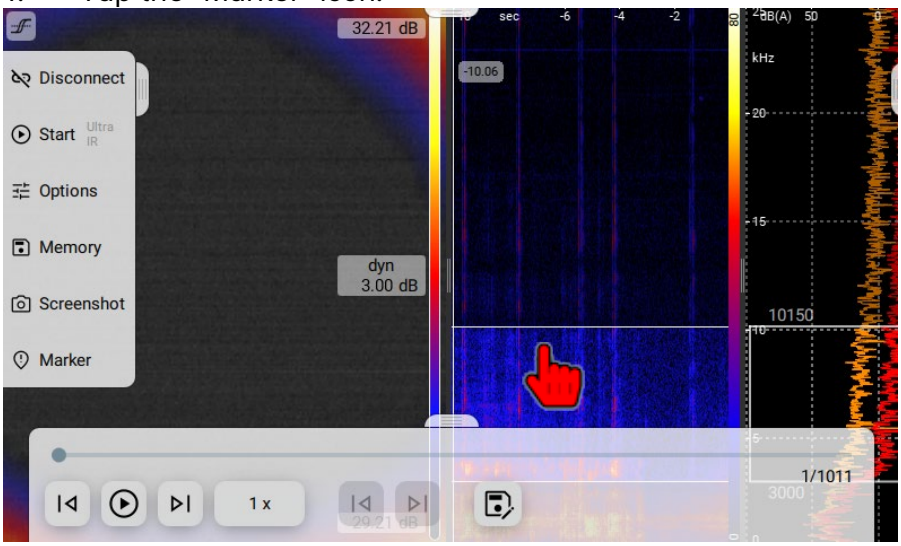
1. Playback a completed or opened measurement.
2. Tap the „Marker“ icon.
3. Tap the "Set" icon.



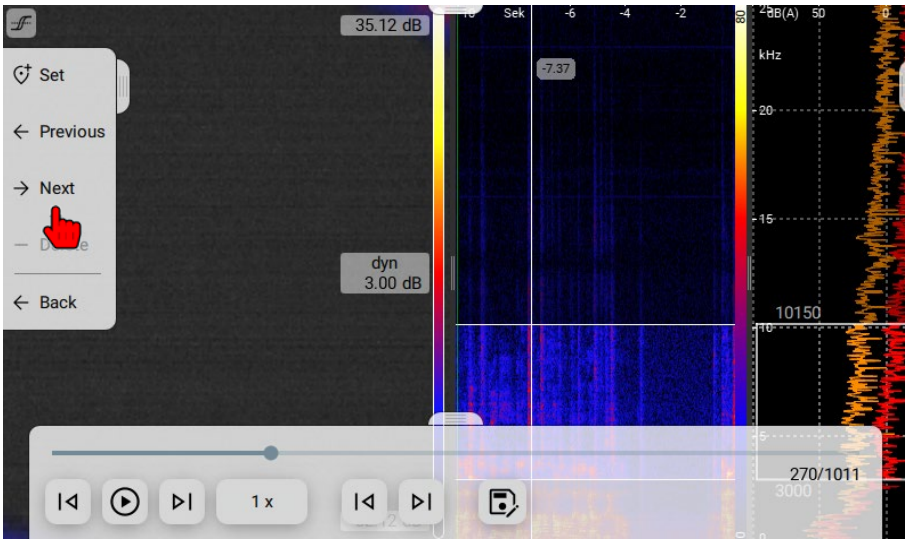
**Navigating between markers**

If measurements contain markers, it is possible to navigate between markers. It is also possible to delete existing markers.

1. Tap the "Marker" icon.




2. Use the "Previous" or "Next" icons to navigate between markers.




3. Optional: Tap the "Delete" icon to delete the currently selected marker.

## 6.4 Customizing the display

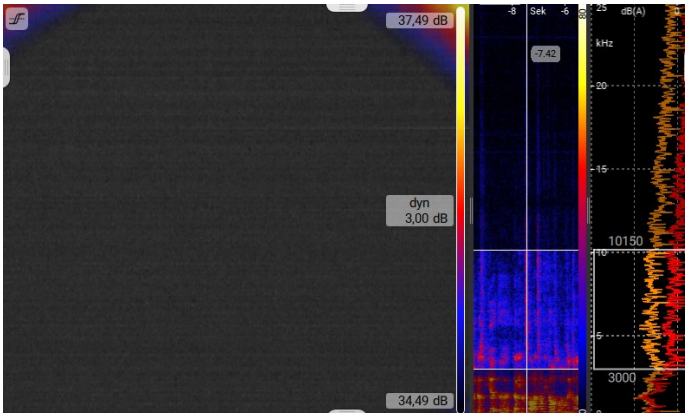
**Description**
The display view and its individual areas may be customized to:

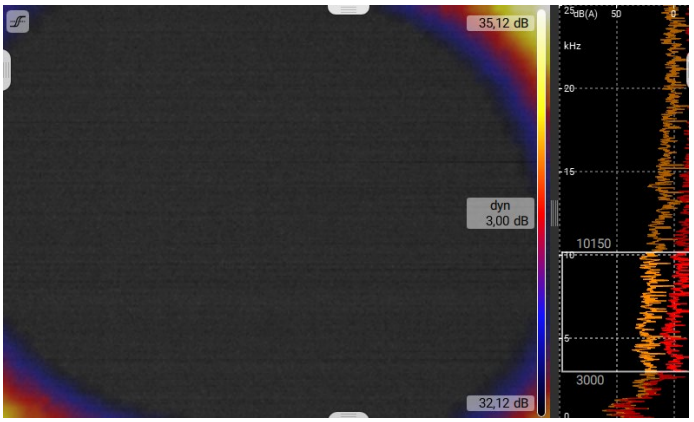
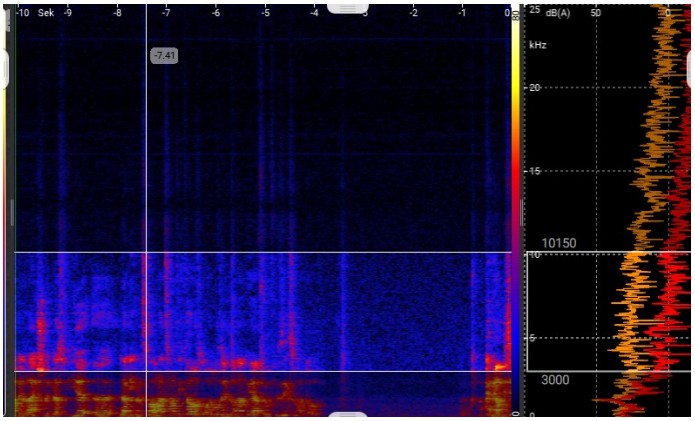
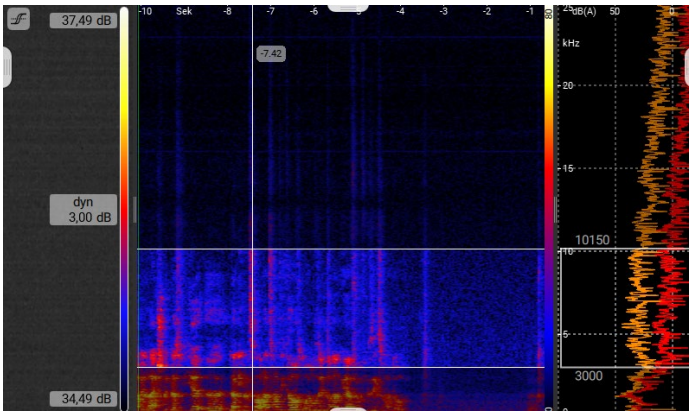
- enhance evaluations during measurement recording and/or
- provide more accurate analyses of completed or saved measurements.

**Changing the display view layout**
Acoustic image, spectrogram and spectrum may either be displayed as full screen or in a combined view. The combined view offers two different layouts.

1. During recording or analysis, double-tap the display view (beam picture, spectrogram or spectrum).

   The layout of the display view changes. Each subsequent double-tap changes the display view according to the following order:

| Order | View | Image |
|---|---|---|
| 1 | Combined view with zoomed-in beam picture  |   |

| Order | View | Image |
|---|---|---|
| 2 | Beam picture as full screen  |   |
| 3 | Spectrogram and spectrum as full screen  |   |
| 4 | Combined view with zoomed-out beam picture |   |

### Customizing beam picture representation

1. In the "Measurement" screen, tap the beam picture and keep pressing for about 2 seconds.
   A context menu with the following display options will open:

| Option | Description/function |
|---|---|
| | Opens a slider to set video camera brightness.<br>▯ Video camera brightness may only be adjusted during measurement recording. |
| | Activates/deactivates crosshairs in the center of the beam picture. |
| | Opens a menu for activation/deactivation and settings of the "Low-Cut" function. |

### “Low-Cut” function

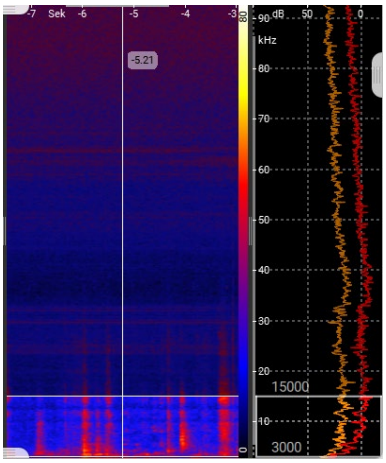
With the “Low-Cut” function, all levels below a customizable cutoff level will be hidden in the beam picture.

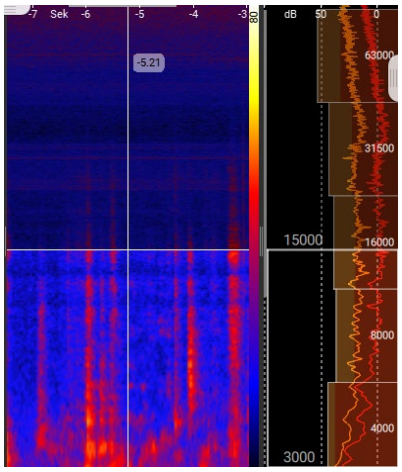
| No. | Description / function |
|---|---|
| 1 | Activates/deactivates “Low-Cut” function. |
| 2 | Raises the cutoff level by 1 dB. |
| 3 | Lowers the cutoff level by 1 dB. |
| 4 | Shows the currently set cutoff level in dB.<br>Tapping the value opens a dialog window for entering a value. |

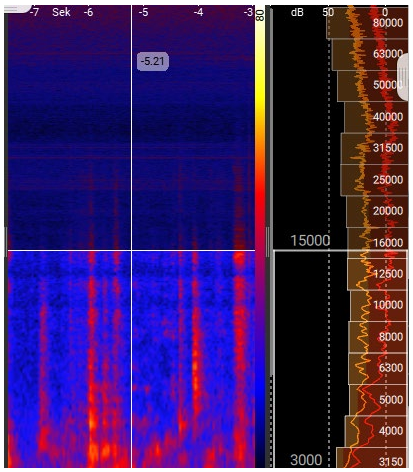
**Customizing spectrum representation**

1. Tap the spectrum and keep pressing for about 2 seconds.
   A context menu with the following display options will open:

| Anzeigeoption | Beschreibung/Funktion |
|---|---|
| | Hiding or unhiding the global spectrum (orange curve) |
| | Hiding or unhiding the local spectrum (red curve) |
| | Cycling through the narrowband, third-octave and octave spectrum |



## 6.5 Creating video or audio files

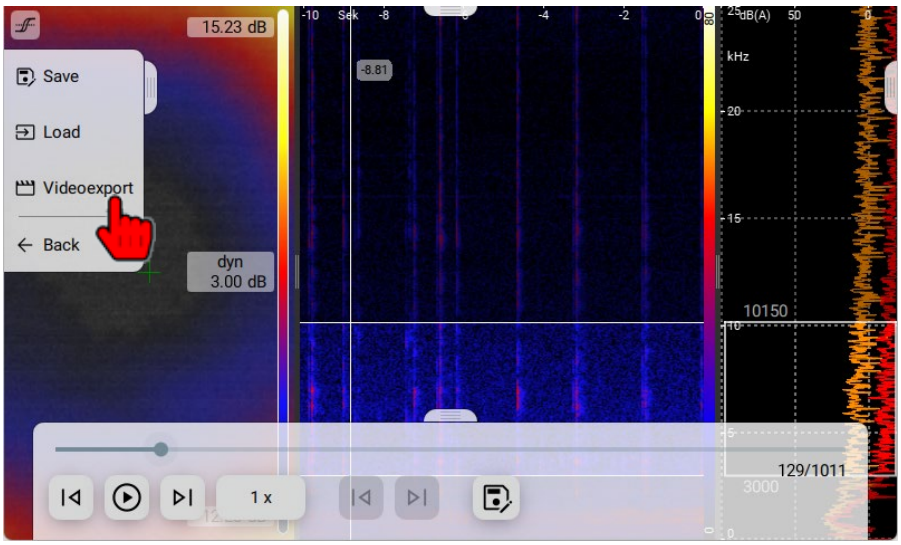
**Description**
A complete measurement or a selectable measurement section may be exported as video or audio file.
Completed or saved measurements may be exported as video file in WebM file format with or without audio content. In the exported video, the visual representations (beam picture, spectrogram and spectrum) are saved in the current layout of the display view.
Completed or saved measurements with activated audio output may be exported as audio file.
The following file formats are possible:

- Opus (*.webm)
- Vorbis (*.ogg)
- Wav (*.wav)

> It is not possible to export leakage measurements as video or audio file.

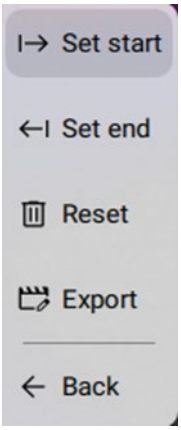
## 6.6 Preparing a measurement for export

1. In the tab “Memory”, tap the "Videoexport" icon.




2. Optional: In the spectrogram, tap the requested beginning of the export file.

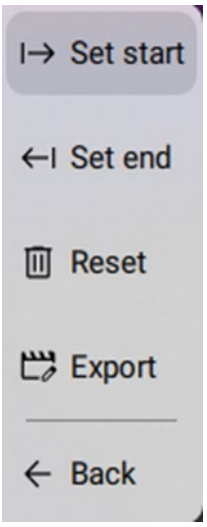
3. Optional: Tap the "Set start" icon.




4. Optional: In the spectrogram, tap the required end of the export file.
5. Optional: Tap the "Set end" icon.
   ☐ The end is marked with a green line in the spectrogram.
6. Optional: Tap the "Reset" icon to set a new beginning and end.

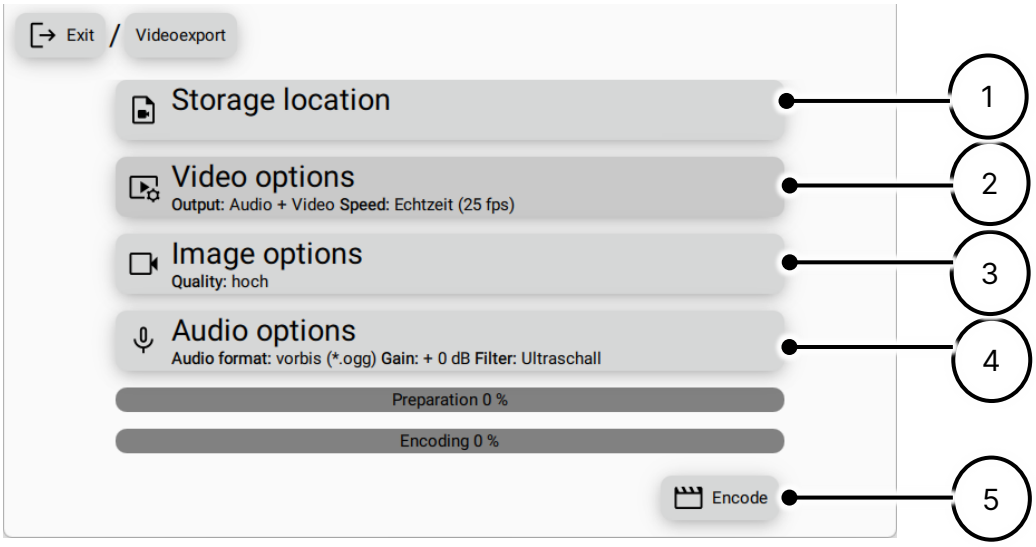
**Exporting a measurement**

1. Tap the "Export" icon.




The selected area is used for export. If no beginning and end are set, the whole measurement will be used for export.

A screen for setting the export options opens.



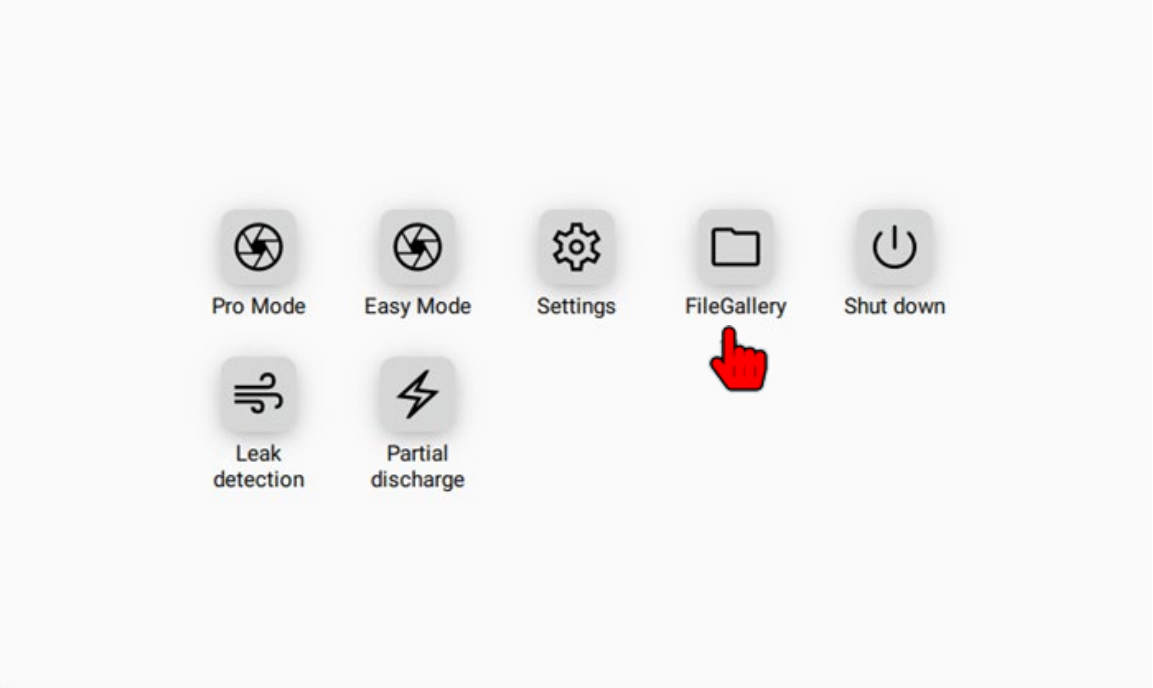

2. Tap the **Storage location** (1) icon and select the saving location and enter the particular file name.
3. Tap the **Video options** (2) icon to select the required output type (audio or video) and the playback speed for the output.
4. In the **Image options** (3) field, select the video output quality.
5. In the **Audio options** (4) field, select the container format of the audio output and the output gain.
6. Tap the "Encode" (5) icon.
   The data are exported with the set options.

## 6.7 Managing measurements

**Description**
Using the integrated data management functions, the measurements and/or directories saved on the device may be:

- copied to a USB storage medium for further evaluation or
- deleted from the device.

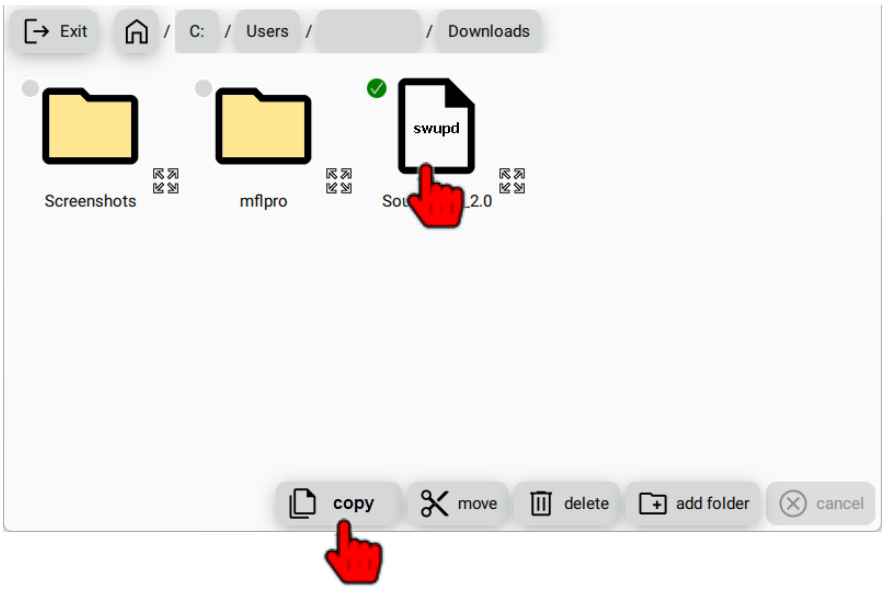
1. Open the "File Gallery" screen.



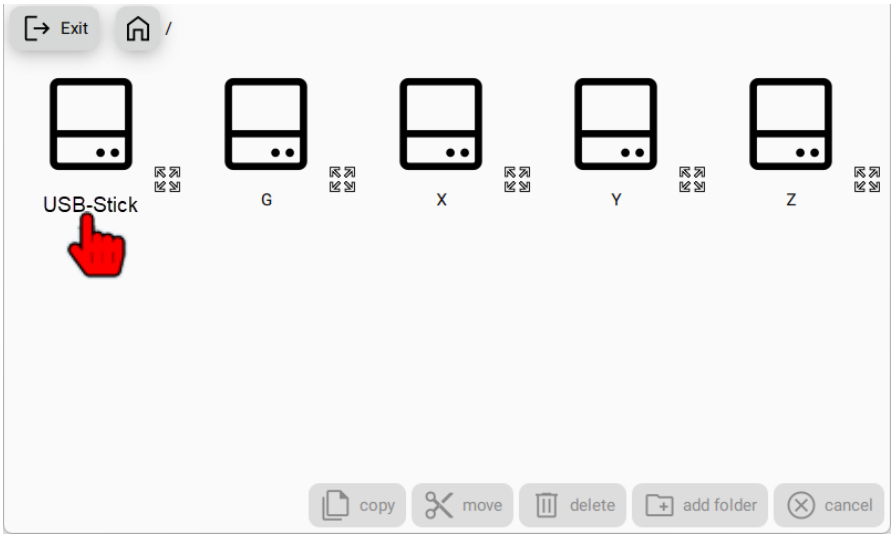
**Transferring measurements to a USB storage medium**

For further evaluation and/or processing, the measurements and/or directories saved on the device may be transferred to a personal computer via a USB storage medium.

1. Connect a USB storage medium to the device.
2. Open Data management.
3. Select the desired measurement file and then tap on the “Copy” icon

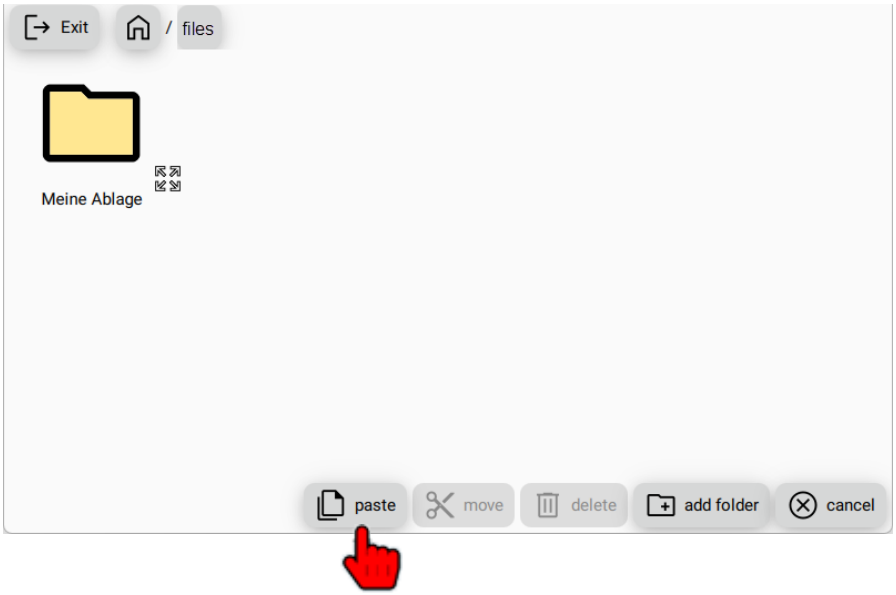



4. Tap the “Home”icon, to select the drive of the USB storage medium




The USB storage medium is opened.

5. Tap on the “Paste” icon

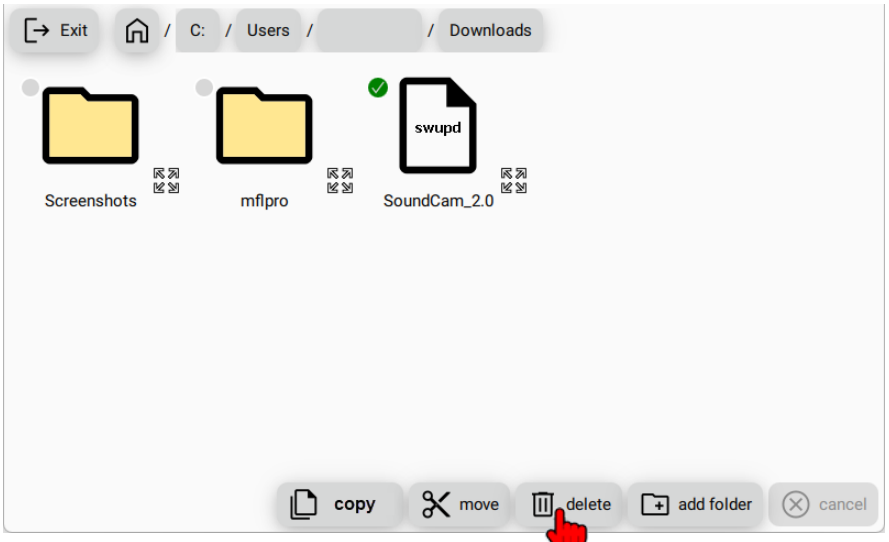



The measurement has now been transferred to the USB storage medium.

**Deleting measurements**

All measurements and devices saved in the device's internal storage or on a connected USB storage medium may be deleted via Data management.

1. Select the particular measurements and/or directories.
2. Tap the "delete" icon.




☐ The “Delete Files” dialog window with a confirmation prompt for deletion of the selected data opens.

3. Tap the Yes button.
   The selected data are deleted.

## 6.8 Using computer software

**Description**
Optionally available computer software for "Microsoft Windows" computers allows to:

- control the device via a personal computer,
- save device measurements on the personal computer and
- create leakage measurement reports.

This section contains descriptions and instructions for using the optionally available computer software.

### Using SONASCREEN 2 software

### Installing the SONASCREEN 2 software

1. Download the software as ZIP file to the computer.

   The download link of the installation file is available in the mysonaphone.com web portal after registration.

2. Extract the ZIP file to the preferred saving location on the personal computer.
3. In the software's directory, double-click the "SONASCREEN.exe" file.
   ☐ The computer software is started.

   **Mind the security settings of the operating system**
   Starting the computer software depends on the security settings of the operating system. If it is not possible to start the computer software, please contact your system administrator.

### Using LeakReport software

For leakage reports, only measurements may be used that were recorded using the “Leakage measurement” recording method.

### Installing

1. Download the software as ZIP file to the computer.

The download link for the software is available in the mysonaphone.com web portal after registration.

2. Extract the ZIP file on the personal computer.
   - ☐ During extraction, the directory "LeakReport Installer" and a "LeakReport Config Installer.exe" file are created.
3. In the "LeakReport Installer" directory, execute the "setup.exe" file.

**Installation with administrator rights**
The "setup.exe" file may only be executed with administrator rights.

   - ☐ The Installation Wizard opens.

4. Execute all steps in the Installation Wizard until the installation is completed.
5. Execute the "LeakReport Config Installer.exe" file.

**Installation with administrator rights**
The "LeakReport Config Installer.exe" file may only be executed with administrator rights.

☐ The Installation Wizard opens.

6. In the Installation Wizard, click the **Install** button.

☐ During installation, the **Confirm file replace** dialog window opens.

7. In the dialog window, click the **Yes to All** button.

### Setup

#### Setting the user interface language

1. In the menu, click the **Language** item.
   - ☐ A dialog window opens for setting the user interface language.
2. Click the particular language.
3. Click the **OK** button.
   - ☐ The user interface language is switched to the selected language.

### Setting units and currencies

Units and currencies will be used for the representation of measured and calculated values on the user interface and in reports.

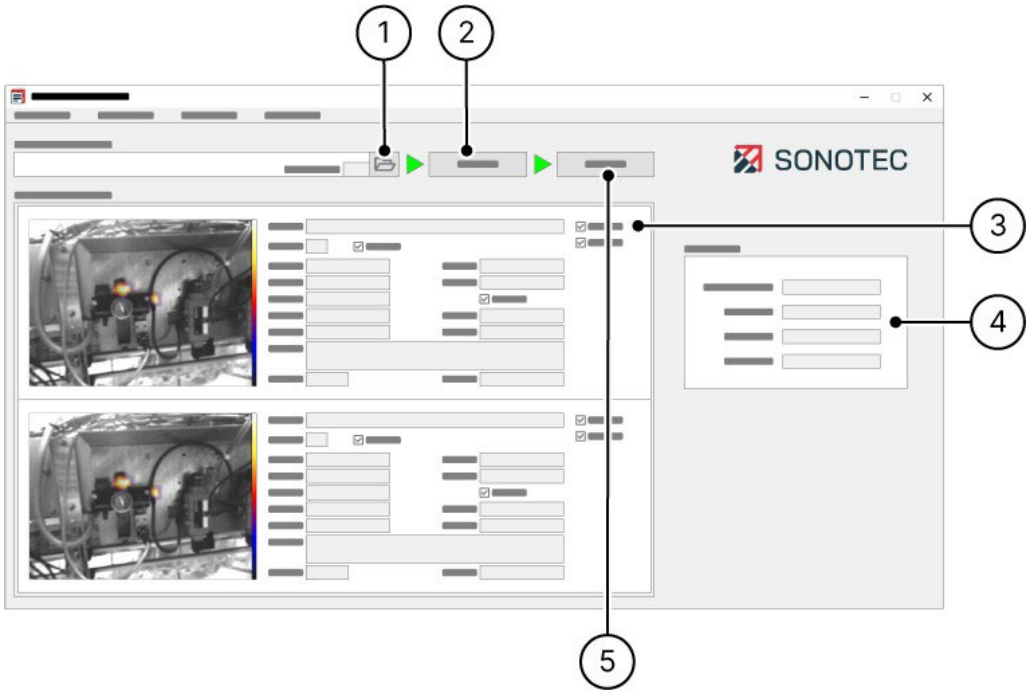
1. In the menu, click the **Units and Currencies** item.
   ☐ A dialog window opens for setting the unit and currency used in the report.
2. Click the **Unit system** field and select the particular unit.
3. Click the **Currency** field and select the particular currency.
4. Click the **OK** button.
   The selected unit and currency are set.

### Setting meta data, loss calculation and priorities

1. In the menu, click the **Configuration** item.
   A dialog window opens for setting the meta data, the loss calculation values and the priority limit values.

2. Enter the particular report meta data (1).
3. Enter the particular loss calculation values (2).
4. Enter the particular priority limit values (3).
5. Click the **OK** button.
   The entered values are saved and used for creation of the subsequent reports.

### Creating a Report

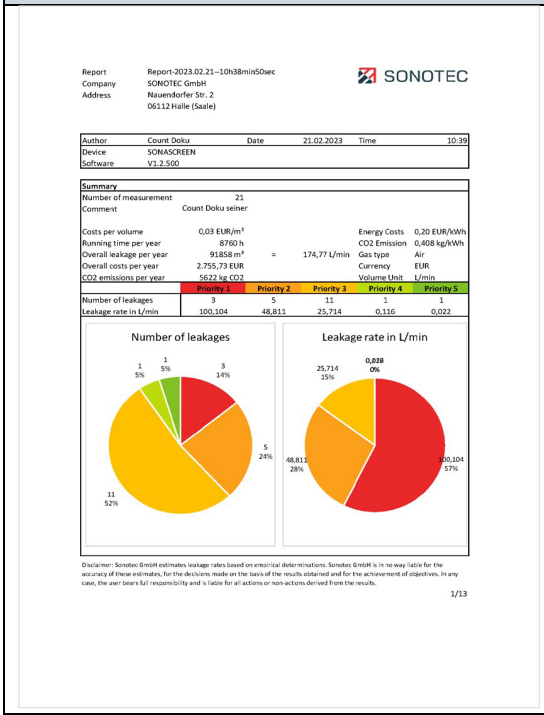


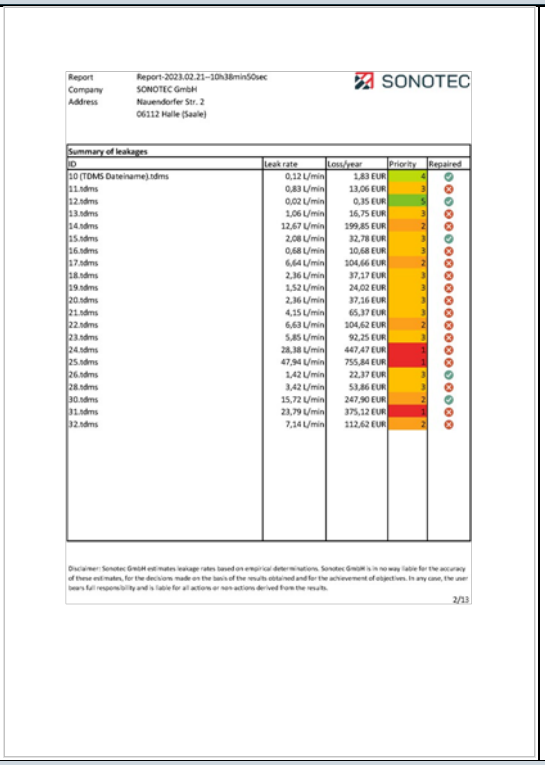

1. Select the directory with the particular measurements (1).
2. Start the analysis (2).
3. Check the measurement data of the individual measurements and if necessary, adjust them (3).
4. View and evaluate the analysis result (4).
5. Start report creation (5).
6. Edit or enter the required report data (name and comment).
7. Create the report.

**Analyze report**

To the best of its knowledge, SONOTEC has developed a procedure for classifying and estimating the total leakage loss based on methods of flow acoustics. SONOTEC is in no way liable for the results obtained or for decisions made on the basis of the results obtained. Any action derived by the end user from the results is the sole responsibility and liability of the end user.

The contents and appearance of a report are defined in worksheets of the report template as follows:

| Cover Page | Content |
|---|---|
|  | Cover page of the report with:<br>• Meta data<br>• Loss calculation values (calculated from the loss calculation settings)<br>• Classification of the measurements contained in the report according to calculated priority with indication of the determined leakage rate<br>• Diagram view of the measurements sorted by calculated priority<br>• Diagram view of the measurements sorted by determined leakage rate |

| Tabular overview | Content |
| --- | --- |
|  | Overview of all measurements contained in the report with:<br>• Name of the measurement data file<br>• Leakage rate in l/min<br>• Loss in €/year (calculated from the loss calculation settings)<br>• Priority level (calculated from the settings of the priority limit values)<br>• Repair status (setting in the corresponding individual measurement) |

| Leak details with pictre | Content |
| --- | --- |
| | Detailed view of the individual measurements with the determined/set measurement data<br>Two individual measurements are displayed per page. |

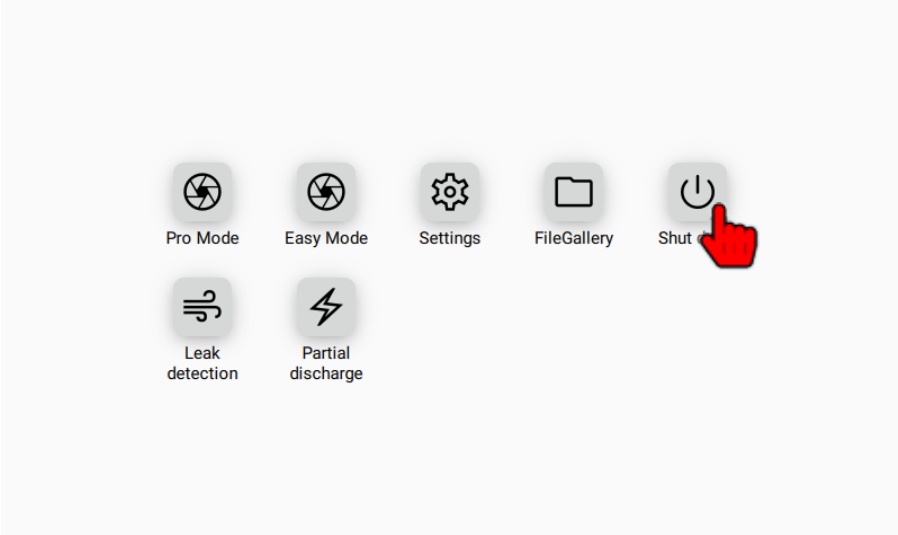
## 6.9 Turning off the device

**Description**
The device may be shut down and turned off either by the software or the on/off button.

**Automatic turn off**
If the turned-on device has not been in use for approximately 5 minutes, it will automatically turn off. Before automatic turn off, a dialog window appears with which the turn-off process may be confirmed or canceled.

**Turning off by software**

1. On the "Start" screen, tap the "Shut down" icon.




The device is shut down and turned off.

**Turning off by On/off button**

1. Press the On/off button and keep pressing for 3 seconds.
   The device is shut down and turned off.

# 7. Maintaining the system

This section contains instructions for maintenance and servicing of the device and the device software.

## 7.1 Updating the device software

**Description**

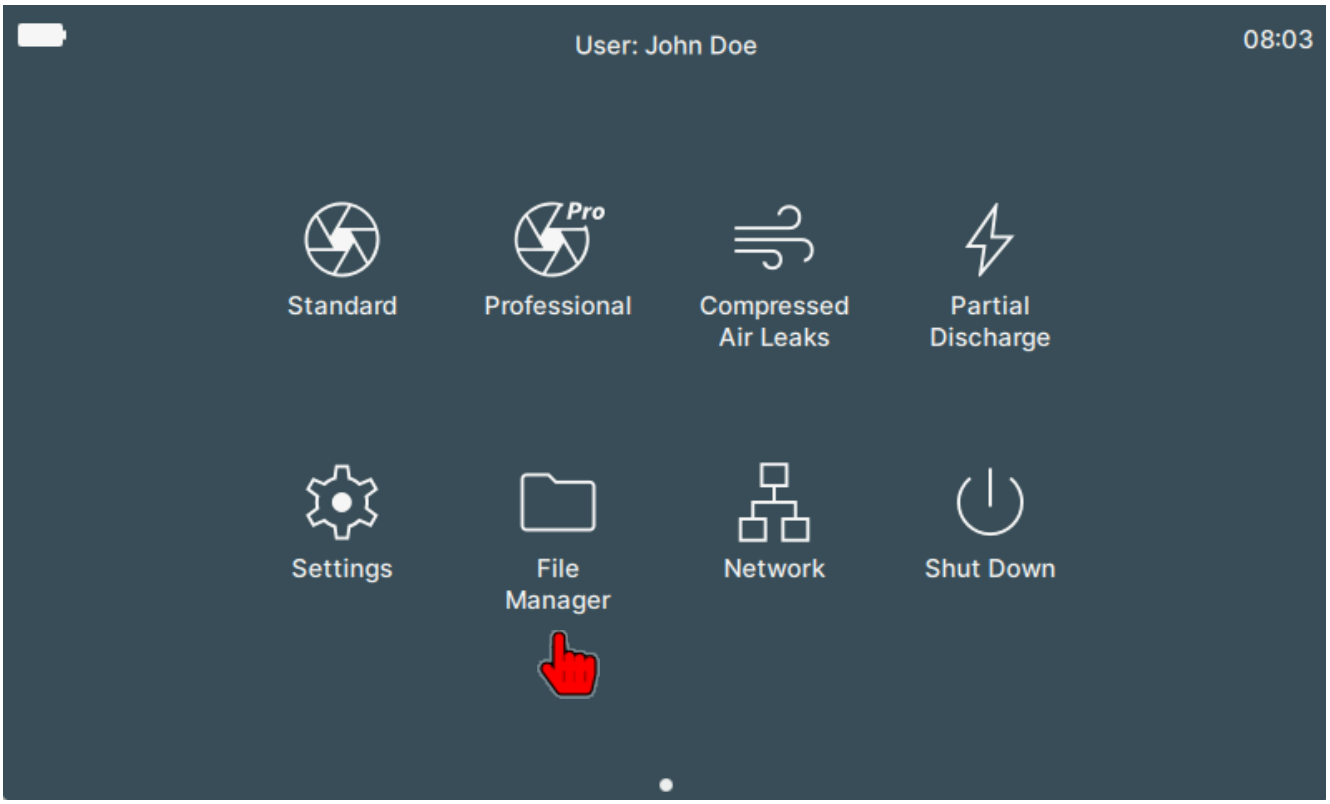
Updates of the device software may be downloaded from the mysonaphone.com web portal. For portal access, a registration is required.

**Downloading the update file**

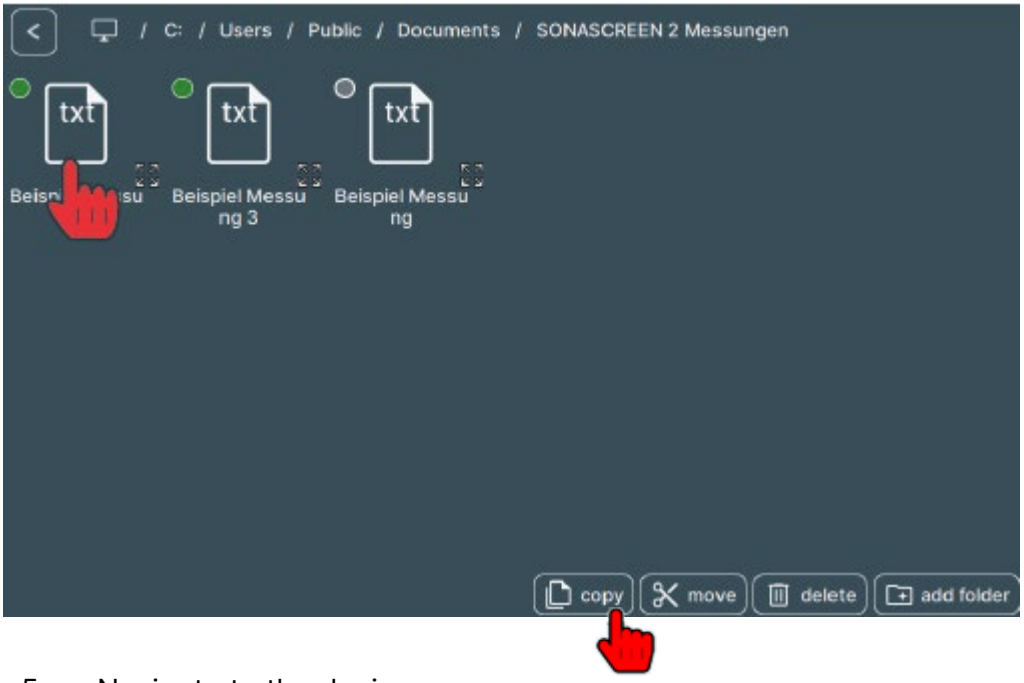
1. Sign in to the mysonaphone.com web portal with your personal login details. After successful sign-in, your personalized portal start page opens.
2. On the personalized start page, scroll down to the "Updates" section.
3. From the list of available update files, download the file with the "swupd" file extension to your personal computer.

**Transferring the update file to the device**

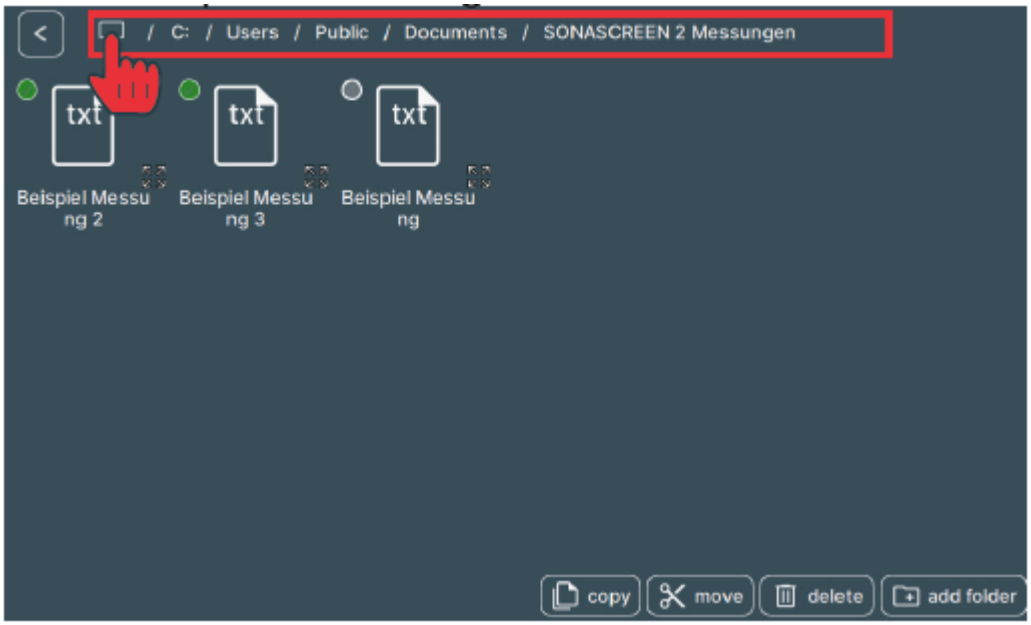
1. Transfer the downloaded update file from the personal computer to a USB storage medium.
2. Connect the USB storage medium to the device.
3. Open the "File Manager" screen and navigate to your USB stick.



4. Tap on the update data and then tap on “copy”.




5. Navigate to the device memory.



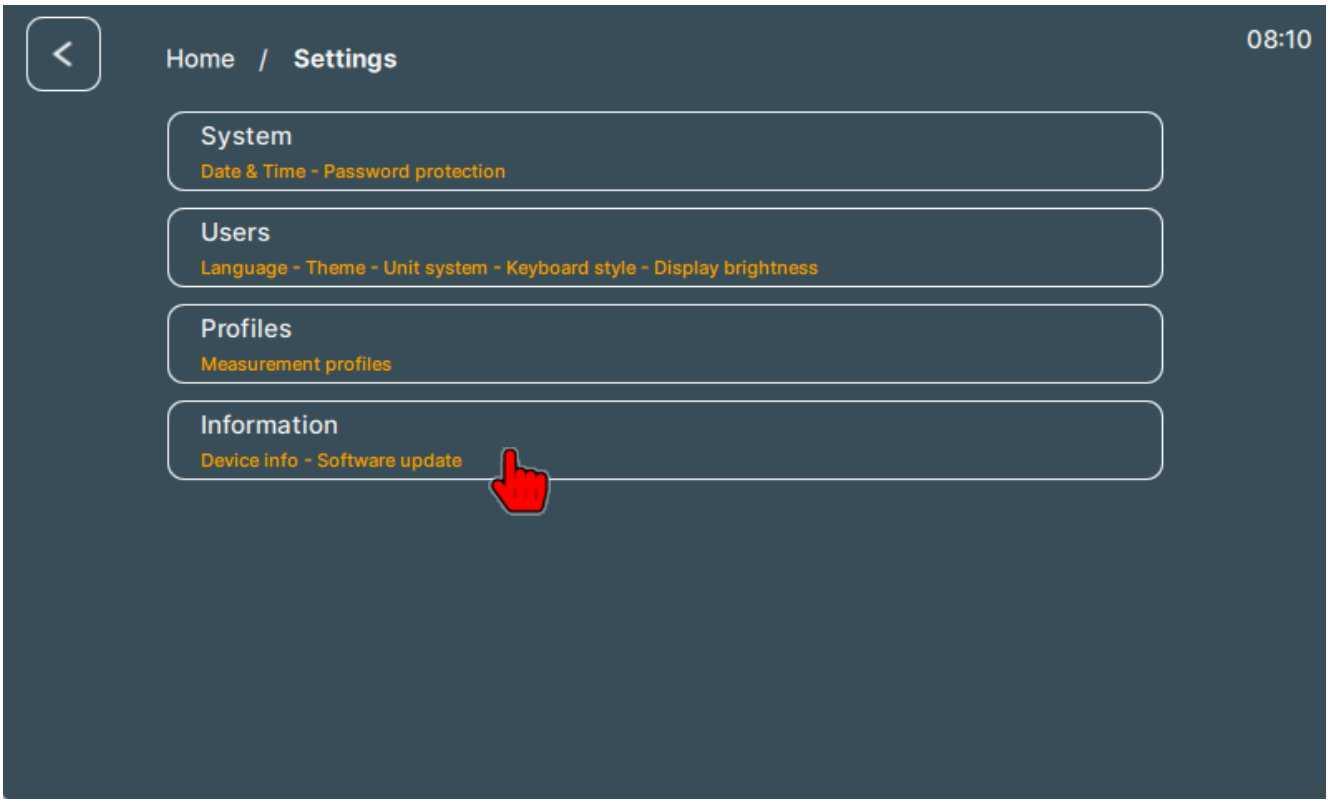
1. Paste the update data.

**Installing the update on the device**

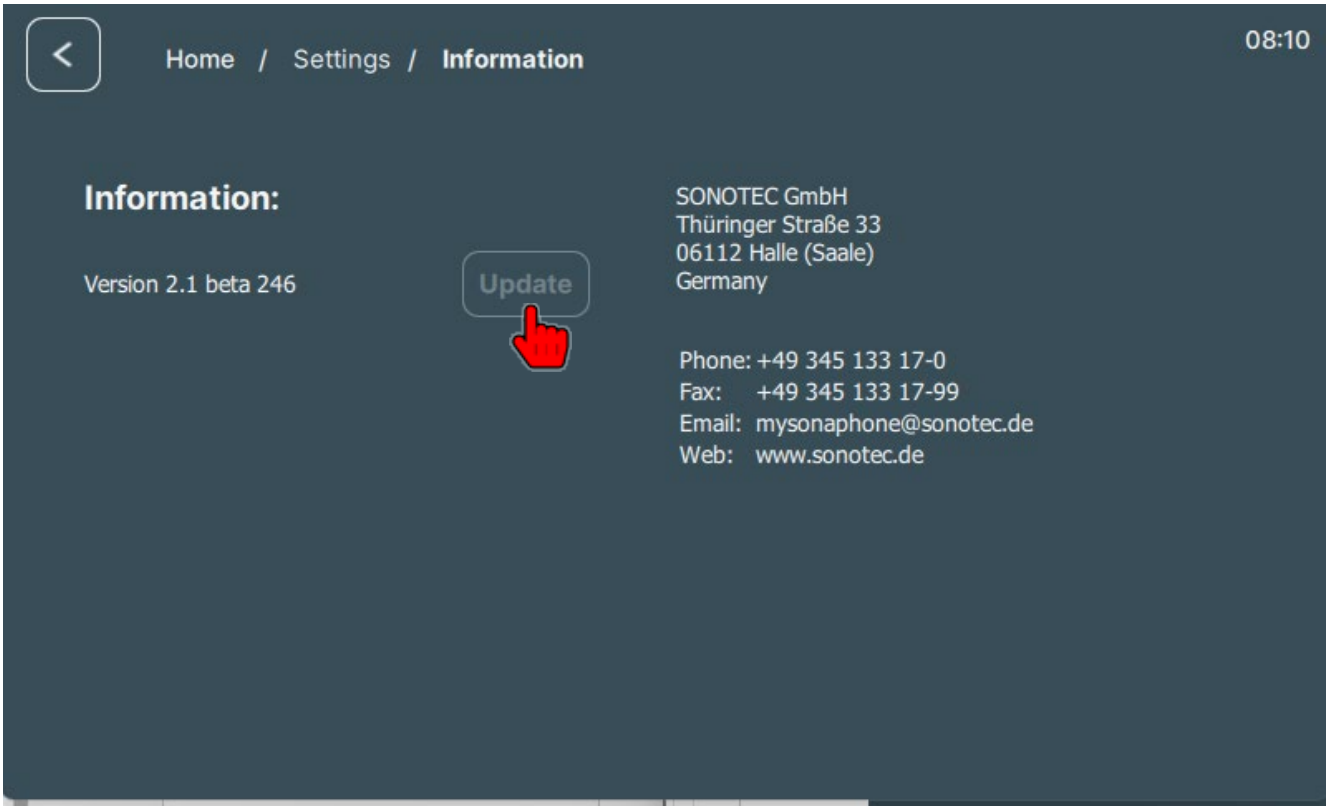
1. Connect the device to the power supply with the power supply unit.

**Connect the device with the charger!**
To install the update file, the device must be connected to the power supply.

2. Turn on the device.
3. Open the "Information" screen.



4. Tap the "Update" icon.




5. In the "File selection" window, navigate to the update file.
6. Mark the update file.
7. Tap the "Confirm" ( ) icon.
   The update process is started.
   After successful completion of the update process, a notification window opens.
8. In the notification window, tap the **Restart** button.

## 7.2 Resetting the device

**Description**
If the device software cannot be executed, you need to reset the device to factory settings or the password has been forgotten, the device software may be reset with an integrated recovery program.
The recovery program:
- starts automatically if the device software has stopped being executable or
- may be started manually.

**Starting the recovery program manually**
1. Turn on the device.
2. During device start-up, keep the upper left function key pressed until the "Recovery" screen appears.
3. Tap the corresponding button to execute one of the following functions:

| Function | Desciption |
|---|---|
| Shutdown | Ends the recovery program and turns off the device. |
| Full Reset | Replaces the installed device software and deletes all data saved on the device. These data include:<br>• Configurations (including password)<br>• User profiles<br>• Measurement data<br>• Screenshots |
| Partial Reset | Replaces the installed device software. Data saved on the device will remain. |

## 7.3 Cleaning and maintenance

**Cleaning**

**Guidelines**
Do not open the product! The product contains no parts to be cleaned by the operator.

**Suitable cleaning products**
Only clean the product on the outside with soft, lint-free cloth.

**ATTENTION**

**Check the compatibility of used cleaning agents!**
The compatibility of all cleaning agents with used materials and colors must be confirmed and approved by SONOTEC GmbH or the respective supplier.

**Unsuitable cleaning agents**
Do not clean the product with:
- scratchy, aggressive, solvent-containing or benzine-containing cleaning agents,
- pressured air, high-pressure cleaner or other kinds of cleaning machine.

**After cleaning**
After cleaning the device, make sure that:
- cables, connectors and fittings are free of cleaning agents and
- cables, wires, connectors and electrical components are dry.

**Maintenance**
**Guidelines**
Do not open the device! The device contains no parts to be maintained or repaired by the operator.

# 8. Storage

**Specifications for storing the device**
Store the device in a dry and clean place.
Observe the storage temperatures as specified under. Only store the device with a fully charged battery.

**Storage regulations**

| Battery charge level | Storage time |
|---|---|
| 100 % | 200 days |
| 10 % | 20 days |

**Avoid deep discharge of the battery**
If the battery of the device is not charged for a long period of time, it can become deeply discharged due to self-discharge. Since lithium-ion batteries must never become deeply discharged for safety reasons, the battery of the device is equipped with an irreversible protection circuit.

**CAUTION**

**Chargeable repair of the device by the manufacturer required!**
The irreversible protection circuit permanently deactivates the battery in case of deep discharge. This leads to the chargeable repair of the device.

- Make sure that the battery of the device is never deeply discharged.
- Make sure that the device is only stored with a charged battery.
- Regularly check the battery charge while storing the device.
- The device's battery may only be replaced by the manufacturer.

**Rectifying deep discharge**
If the battery is deeply discharged, please contact SONOTEC GmbH or its distribution partners to initiate appropriate repair.

Please note that the repair of deeply discharged batteries is not covered under our warranty.

# 9. Troubleshooting

| Potential error | Possible cause | Troubleshooting |
|---|---|---|
| Device does not start | Battery is deeply discharged | Contact the manufacturer or your sales partner. |
| Device does not start | Firmware faulty | Perform partial or full reset. |

# 10. Technical data

| General data | |
|---|---|
| **Article number** | SONASCREEN 2: 400 01 0273 |
| **Dimensions (L × W × H)** | 12.2 × 6.3 × 2.2 inch \| 31 × 16 × 5,5 cm |
| **Weight** | 3.3 lb \| 1.5 kg |

| Electrical data | |
|---|---|
| **Power supply** | Charger (65 W max.) |
| **Battery** | Lithium-Ion battery (48 Wh) |
| **External Powerbank (optional)** | Lithium-Ion battery (88 Wh) |
| **Runtime** | approx. 3.5 h (continuous operation) + 6.5 h with external battery |
| **Charging time** | 1.5 h (typical) and 4 h for the Powerbank |

| Connections and interfaces | |
|---|---|
| **Data export** | Socket USB 2.0 Type-A |
| **Headphones** | Jack socket 3.5 mm |
| **Charger** | USB-C |
| **Control system** | Socket Ethernet RJ45 |

| Hardware | |
|---|---|
| **Device storage** | 1TB M.2 SSD |
| **Display** | Type: TFT, 10-point multi-touch capacitive<br>Dimension: 7"<br>Resolution: 1,280 × 800 Pixel |
| **Sensor system (acoustic)** | Microphones: 176 digital MEMS microphones<br>Frequency range: up 100 kHz<br>Sampling rate: 200 kHz<br>Sound pressure level: 120 dB max.<br>Resolution: 24 bit |

| | |
|---|---|
| **Sensor system (optical)** | Camera: digital<br>Resolution: 320 × 240 pixels (at 50 fps) or 640 × 480 pixels (at 16 fps)<br>Aperture angle: 70 ° |

| **Infrared sensor** | |
|---|---|
| **Spectral range** | Longwave infrared, 8 ... 14 µm |
| **Resolution** | 160 × 120 Pixel, progresiv sampling rate |
| **Effective frame rate** | 8.7 Hz |
| **Thermal sensitivity** | < 50 mK (0.050°C) |
| **Measuring range** | -10° to +140°C (+/-5°C or 5%<br>-10° to +400°C (+/-10°C or 10%)<br>Larger value is to be applied |

| **Software** | |
|---|---|
| **Device software** | Linux |
| **Computer software** | Microsoft Windows (from Windows 7) |
| **Languages** | German, English, Spanish, Croatian, Italian, Japanese, Korean, Polish, Turkish, Chinese |

| **Ambient conditions** | |
|---|---|
| **Operating temperature** | -4 ... +122 °F |
| **Storage temperature** | -22 ... +140 °F |
| **Charging temperature** | 32 ... +113 °F |
| **Protection type** | IP54 |

# 11 Disposal

**Recycling and taking back of used equipment**
Electrical and electronic devices may pose a risk to health and the environment if disposed of incorrectly. They cannot therefore be disposed of as domestic waste according to WEEE Directive 2012/19/EU (Waste Electrical and Electronic Equipment Directive). Instead they must be taken to designated collecting points or returned to the manufacturer.
The following symbol indicates the legal duty to dispose of electronic devices as stipulated.

They must undergo specified recycling processes (e. g., with respect to batteries or circuit boards) which enable safe, environmentally compatible re-use or separate disposal of different device elements.
The return of used devices is regulated differently in different places. Find out from your local council about the return conditions for commercially used electronic devices. The device, including rechargeable battery, contains no toxic substances requiring separate identification for disposal such as mercury (Hg), cadmium (Cd), lead (Pb) or chrome 6 (e. g., in plated parts or circuit boards).

**Removing the battery**
According to legal requirements, batteries must be disposed of separated from their electrical devices. For self-dependent disposal at designated collection points, the batteries must be removed from the device.

**CAUTION**

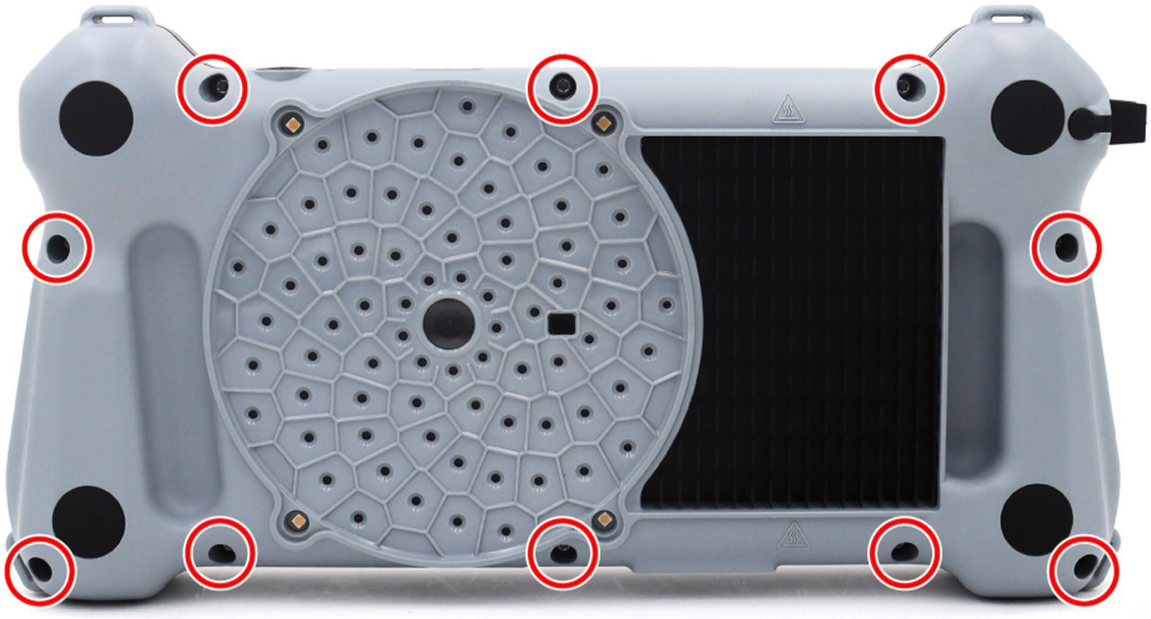
**Device damage and warranty voidance by opening the device!**

Opening the device will damage it and render it unusable. This will void all warranty claims.

- Remove the battery only for the purpose of device disposal.

1. Remove the ten screws from the housing cover.

Screwdriver Torx TX10



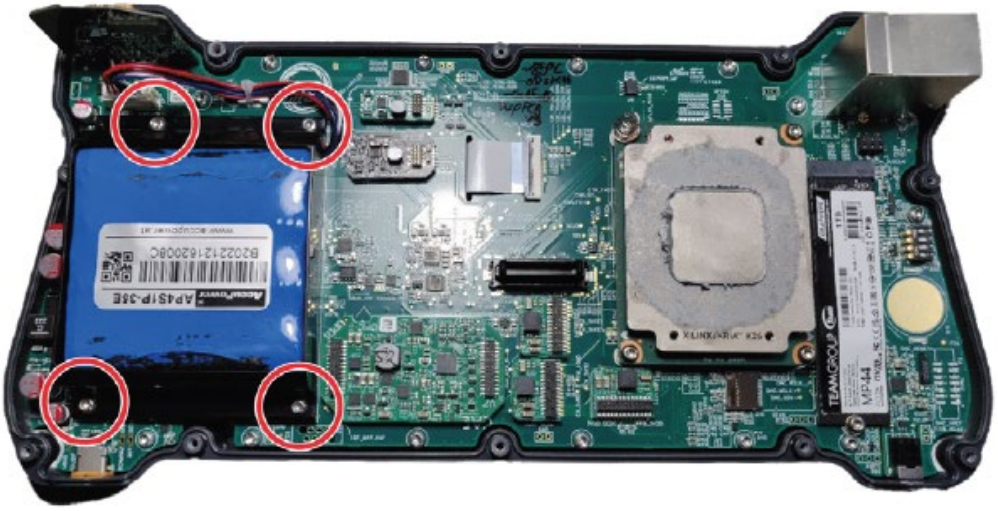
2. Remove the housing cover.

**CAUTION** – Do not tear off the cable.

3. Remove the four screws of the microphone array.

4. Remove four screws of the battery holder and remove the the battery.

Screwdriver Torx TX6



5. Dispose of the battery and device separately according to legal requirements.

# 12 Warranty

**Condition at delivery**
All products and accessories have been tested thoroughly before they leave the factory, are state-of-the-art products at the time of delivery and adhere to all applicable safety regulations.

**Warranty**
During the warranty period, SONOTEC GmbH will eliminate all deficiencies caused by material or manufacturing faults free of charge. SONOTEC GmbH will at its own discretion offer warranty by reparation or replacement of faulty products.
**Exceptions**
Internal accumulators as well as damage caused by unintended use, by wear or by manipulation of the product are exempt from warranty. The warranty also does not cover those faults that affect value or usability of the product to a negligible amount.

**Responsibility of the user/operator**
It lies within the responsibility of the users to ensure that the product has been installed and set-up properly and is used in a manner that does not impair safe operation.

**Operating errors**
Operating errors can never be completely ruled out by the manufacturer. SONOTEC GmbH is in no way liable for any direct or indirect damage caused by operating errors (e.g. damage on software and/or hardware, damage by downtime, damage by malfunction as well as damage or loss of measurement and test data).

**Quality of captured data**
The determination of valid test results, their interpretation and the actions derived therefrom are exclusively subject to the personal responsibility of the users. SONOTEC GmbH does not guarantee the correctness of determined test values and/or test results. SONOTEC GmbH does not assume liability for any faults or damages that might occur due to further use of determined test and measurement values.

# 13. Manufacturer information

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**Certifications and registrations**

- Quality management according to ISO 9001:2015
  (Certificate Registration No.: 091006014)
- Registration according to ElektroG at the ‘stiftung elektro-altgeräte register’ (ear):
  WEEE Reg. No. DE 22125904

**Contact**

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